

FAQ.3

Frequently Asked Questions of the Modern AFV Painting Techniques

By Rubén González



All The Techniques Necessary to Build Any Modern AFV by the Master Modeler Rubén González



Abteilung 502

It's not the best because it's expensive,
It is expensive because it is the best.



F.A.Q. 3



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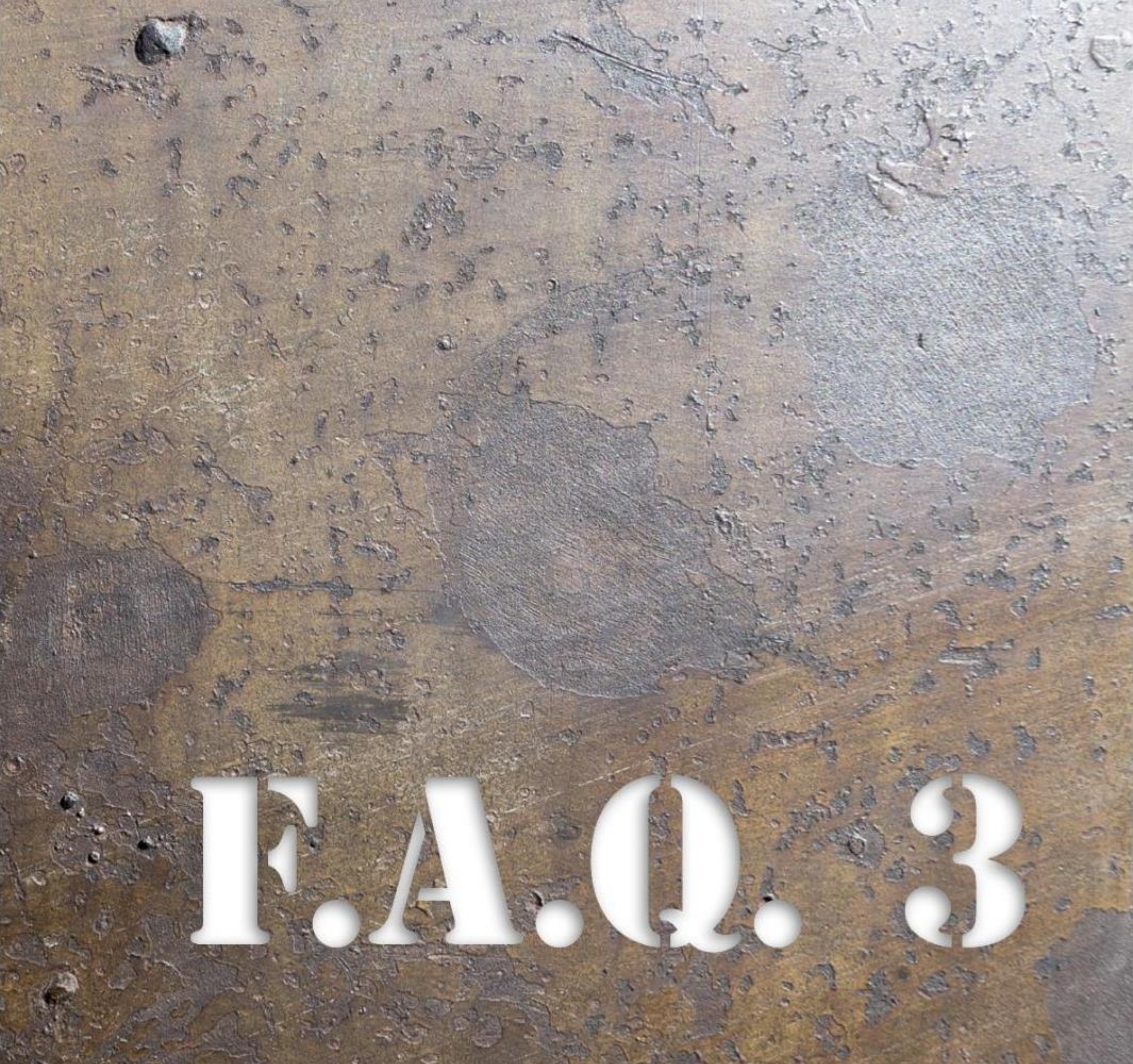
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It is true that there are people who are capable of great achievements without any help. Just by their own efforts they can bring home a personal challenge.

The above statement can also be applied to the great work that several people, as a team, can perform. This can be even more challenging since one has to think of the own work, but also of coordinating the effort with other people.

With all of the above in mind I'm very grateful for all the effort and dedication of all people who have contributed, in one way or another, to the creation of this book. Without them this would not have been possible.

"To all the people with whom I have shared, even if briefly, something wonderful in this hobby."

Rubén González Hernández

INTRODUCTION

This new book, like its predecessors in this same series of technical books called "FAQ", is dedicated to modeling military vehicles and the techniques most commonly used for assembly, painting and weathering.

The main difference with the previous book is that we have moved on in the time-frame. This book will focus on modern vehicles and how to set them in the conflicts that have taken place from the Vietnam War up to the present day. But not only this, we will explain some new techniques that have appeared these last years, mainly to use in modern vehicles but that can be also used in vehicles of all eras.

Military modelling, like so many other things around us, evolves and it does so because it adapts to the environment. Unfortunately the environment we are talking about are the conflicts that take place in different areas and regions of the planet. These have changed since the days of World War II and previous conflicts.

The painting, weathering and ambience-creating techniques that we are applying to our models, whether they are from past or current wars, haven't changed and we still refer to them in the same way. However, the effects we apply to models can vary for obvious reasons.

For starters, the conflict scenarios have changed and although the weather conditions are not different from back in the day the geographical locations of the conflicts are different, which has an impact on the look of vehicles.

The maintenance that such vehicles require has also changed. Although this is not general and also depends on the services available to the opposing forces, fact is that vehicles and weapons have become highly sophisticated and sensitive and therefore require a much more delicate maintenance to remain perfectly operational.

Last, but not least, the materials that make up modern vehicles and weapons have changed considerably since World War II. Materials that were out of the question on a technological and industrial level back then are now commonplace. The use of these new materials and the manufacturing and assembly methods reflect on the way we paint and weather these models; they require a different approach.

To the above factors, another decisive factor must be added, and that is the colour of the vehicles. The options for painting a vehicle have become virtually endless and this is reinforced by the fact that rebel forces will simply use anything that comes to mind to go about their business unnoticed.

We used to paint our models in green, yellow or the usual tricolour camo pattern, but nowadays there are the most outlandish combinations that require us to dig deep in the colour palette to get the most out of the modern base colours and camouflage patterns.

With everything and saving the distances, sometimes we should be more subtle when applying the usual techniques or try to obtain after its application slightly different results about these representative models of vehicles used in modern wars.

Like many other things in life, in the end the purpose is to avoid monotony and to take up new challenges. In this book we present some of those challenges.

Index

8 I. SOMETHING ABOUT HISTORY

10 II. TECHNIQUES

11 CHAPTER 1: ASSEMBLY TECHNIQUES AND SPECIAL EFFECTS

- 12 1. BASIC DETAILING
- 12 - Getting started
- 14 - Weapons
- 16 - Handles
- 19 - Towing cables
- 20 - Wiring and conduits
- 22 - Metal chains
- 23 - Side skirt and fenders
- 26 - Tracks
- 28 - Grills
- 30 - Rivets
- 31 - Weld lines
- 33 - Exhaust pipes
- 34 - Gallery
- 36 2. RESIN IMPROVEMENTS
- 42 3. SUPERDETAILING
WITH PHOTOETCH
- 52 4. SOLDERING
- 58 5. MODIFYING THE SUSPENSION SYSTEM
- 64 6. DAMAGED RUNNING GEAR
- 68 7. ARMOURED VEHICLES
- 68 - Enigma
- 70 - Mexas
- 71 - Metal plates
- 74 - Welded slats
- 76 - Using sandbags
- 80 8. HEADLIGHTS, PERISCOPES AND GLASSES
- 88 9. INTERIORS AND ENGINES
- 98 CHAPTER 2:
TEXTURES AND ANTI-SLIP SURFACES
- 100 1. TEXTURES
- 100 - Using a mini-drill
- 101 - Using liquid glue
- 102 - Using cyanocrylate
- 104 - Using putty
- 106 - Easy Cast Texture Medium
- 108 2. ANTI-SLIP SURFACES
- 108 - Using a spray
- 110 - Specific products
- 112 - With sand and putty
- 114 - With sandpaper sheet

116 CHAPTER 3: THE WEATHERING PROCESS

128 CHAPTER 4: BASES, CAMOUFLAGE AND MARKINGS

- 130 1. PLAIN COLOR SURFACES
- 130 - Zenithal Lighting
- 135 - Colour modulation
- 142 2. CAMOUFLAGED BASES
- 142 - Hand painting
- 147 - How to use masks
- 158 3. MARKINGS
- 164 4. CHIPPING FLUIDS
- 164 - Chipping in aluminium
- 167 - Xtreme rust

178 CHAPTER 5: FILTERS

184 CHAPTER 6: WASHES

190 CHAPTER 7: WEAR&TEAR

200 CHAPTER 8: CHIPPING

210 CHAPTER 9: RUST EFFECTS

218 CHAPTER 10: DUST AND MUD

226 CHAPTER 11: WET EFFECTS

232 CHAPTER 12: ACCESORIES

- 234 1. STOWAGE AND FIGURES
- 234 - Choices
- 236 - Load on trucks and light vehicles
- 239 - Stowage on armoured vehicles
- 240 - Stowage on vehicles
- 244 - The human factor
- 248 2. CANVAS AND NETS
- 249 - Canvas with modelling foil
- 251 - Canvas from two-part putty
- 258 - Photoetched camouflage nets
- 260 - Barracuda nets
- 262 - Examples and applications
- 268 3. CAMOUFLAGE USING VEGETATION

274 III. WEATHERING

274 CHAPTER 1: LIGHT VEHICLES

- 276 - B11 Recoiless gun (Six-Day War in 1967)
- 281 - M151 IDF Mutt (Beirut – Lebanon War in 1982)
- 286 - VBL PANHARD (Gulf War – 1990/91)
- 292 - Iveco LMV Lince (Afghanistan War - 2008)

300 CHAPTER 2: MEDIUM SIZE VEHICLES

- 302 - M1078 Cargo truck
- 314 - KRAZ-255B Off-road truck (Croatian, Bosnian War – 1992-95)
- 326 - BMR 600 VCZ (UN – Bosnian War – 1992-95)
- 332 - M113 ACAV (Vietnam – 1971)
- 338 - M113 Dualtex (Australia – 1980)
- 348 - M113 IDF (Gaza – 2004)

354 CHAPTER 3: HEAVY VEHICLES

- 356 - Bradley M3A3 (Iraq – OIF 2003)
- 368 - T-55 KO (Afghanistan War - 1981)
- 384 - T69-II (Basra - Iraq / Iran War – 1987)
- 392 - Merkava Mk.I (Beirut - Lebanon War - 1982)

410 IV. THE FUTURE OF MODELLING

410 CHAPTER 1: DIGITAL 3D REVOLUTION

422 CHAPTER 2: DETAILING A PLASTIC KIT WITH 3D PARTS

444 V. GALLERY

SOMETHING ABOUT HISTORY

Unquestionably the history of humanity is linked to great conflicts and battles between brothers, neighbours and between people with different beliefs and ways of thinking and living.

Wars have been present in all known periods of history. The term modern war however is used to describe conflicts that have taken place after the Second World War.

Terms such as asymmetric, biological, electronic or psychological warfare are widely known. They are used to define and classify the different types of modern wars whose structure has changed over time, as if they were a car model. We are currently in the fourth generation, characterised by the great operational and technological discrepancy between the opponents.

Today, war is more graphic than ever. Everything is observed, recorded and shown. Nothing escapes the news papers and television cameras. In fact, there are many who constantly risk their lives to document everything that reaches our homes. And sadly there are those who have lost their lives in a war zone, collecting data that, instead of serving to avoid future conflicts, is just used to attract attention, glue people to their screens and serve politics. How regrettable this is. At the same time all this information and data is used by kit manufacturers to offer the wide variety of kits that flood the market. Like the rest, they have evolved and have adapted by offering models with great detail and an unprecedented level of realism.

Obviously technological improvements have also contributed to this. The investment in R&D that some manufacturers do, introducing innovative development and manufacturing techniques such as 3D design and printing technology make what was previously impossible a reality.

The 3D technology currently is still in its early stages, but who knows what it can lead to in the future?

Manufacturers have noticed that the demand for contemporary vehicles is growing. As a result more modern vehicles are joining their catalogs and at present they are working hard to offer almost any vehicle and version present in any modern war.

In fact, the manufacturers have gone as far as offering certain civilian vehicles that can be found in some conflicts and that face, with little chance of success, the most modern and advanced combat vehicles.





For the AFV modeller this implies an expanded horizon of models, camouflages, atmospheres and theaters of operation, covering the entire time spectrum from the Second World War to date.

This is a brief chronology of some of the recent conflicts and wars on which many of us base our work:

- 1955-1975 Vietnam War
- 1960-1966 Congo crisis
- 1961 Bay of Pigs
- 1964-1979 Rhodesia Civil War
- 1967 6-Day War
- 1967-1970 Nigerian Civil War
- 1973 Yom Kippur War
- 1974-1994 Angolan Civil War
- 1975-1979 Cambodian Genocide
- 1978-1992 Afghanistan War (vs The Soviet Union)
- 1980-1988 Iran-Iraq War
- 1981-1986 Uganda Civil War
- 1982-1985 Lebanon War
- 1982 Falklands War
- 1986-1987 Toyota War (Libya and Chad)
- 1987-1993 First Intifada
- 1988-Today Somalia War
- 1990-1991 First Gulf War (Iraq, Desert Storm)
- 1991-2002 Sierra Leona Civil War
- 1991-1995 Croatian War
- 1992-1995 Bosnian War
- 1993 Battle of Mogadishu
- 1994-1996 First Chechen War
- 1998 Kosovo War
- 1999-2009 Second Chechen War
- 2001-2015 Afghanistan War (vs The US)
- 2003-2011 Second Gulf War - Operation Iraqi Freedom
- 2008 Osetian War
- 2011 Libyan War
- 2011 Sirian Civil war
- 2014-2015 Ukrainian Civil War

This is a hobby like any other, and as such it plays a basic role: it allows us modeling geeks to use some of our free time in a healthy way. Often it also helps to make friends outside of our usual neighborhood.

War is a regrettable thing, but there always has been war and unfortunately there always will be. For us modelers it usually is nothing more than a source of inspiration for creating, painting and setting our models.

II. TECHNIQUES

The word "technique" in its broadest and most literal sense refers to the whole set of procedures or resources that are used in a certain discipline, artistic or scientific, or in the development of a specific activity. They usually require certain skills and are improved with practice.

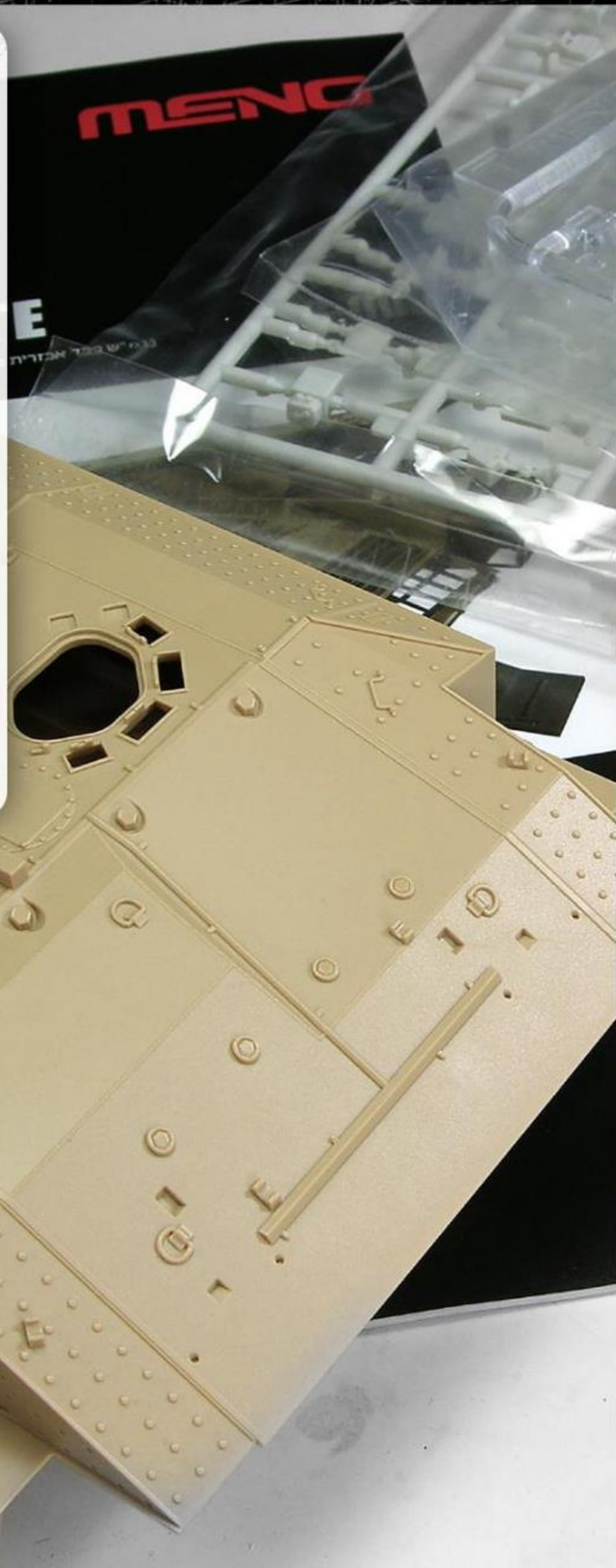
Modelers, being part creator and part artist, can also talk about techniques and even give them names.

But, as the name suggests, when we talk about technique we must not think about the "processes" we perform to apply it, but also about the tools and resources to bring the technique into practice.

Again the word "practice" appears. Some people say that everything in life is a matter of practice, although sometimes, mastering a discipline requires just a bit more.

That difference, is small, sometimes imperceptible. It is hidden somewhere in our mind. The challenge is to find it and exploit it because that "something" is not easy to find. It is what distinguishes us from each other at the precise moment we hold a brush between our fingers.

Techniques, processes, tools and resources applied to modern vehicles, that is what we will try to cover, understand and apply throughout the first part of this publication.



CHAP 1

Assembly techniques and special effects.

In this chapter we are going to have a closer look at a number of topics related to the assembly phase, intensely hated by some and dearly loved by others.

Back in the days when models couldn't be compared to what we have today the construction phase was a true nightmare. Back then the key to a good build was accumulating mountains of books and documentation and a serious investment in courage and patience. Manufacturing errors and accuracy issues were commonplace.

Once the model was built it often was an act of faith to believe the model actually represented what the manufacturer had promised and any resemblance to the real thing was rather coincidental.

Add some fitting issues and limitations in the manufacturing process and the whole thing could end in disaster.

Fact is that all of this has improved tremendously in recent years and current kit standards are far beyond those of the early days. Very often kits now contain all the improvements that we used to buy as 'aftermarket' items to detail our models. There's no more need to buy them separately.

Next we will try to detail our models using homemade improvements, using photo-etched parts, soldering small pieces or modifying parts of our vehicle to improve its final look well on the ground or on a simple base stand.

II.1.1. BASIC DETAILING

Modelers are human beings and therefore come with virtues and vices. One of the most common vices among modelers is the tendency to buy more models than they can possibly finish. We end up being more collectors than modelers. This often affects the way we assemble and detail models for sheer lack of time.

Models are not like some wines that get better with time. On the contrary, the models in our shelves risk becoming outdated when a manufacturer decides to release an improved version of that 'jewel' we have been guarding like gold with all the upgrade kits. Suddenly we are less happy with our treasure...

The moral of the story is quite simple. When you feel the need to assemble a model, look for the latest in the market and you will prob-

ably save time and money. Regardless of the age or brand of a model all of them can benefit from small modifications.

We understand as "basic detailing" the minimum improvements that usually we add to a model during the assembly phase to make it credible. Among them, I would highlight the replacement of handles, remove or add rivets, weld lines, replacement of towing cables, gun barrels and oversized parts, ...

Next we will show how to make some of these basic improvements. We will discover many other improvements that we can perform with relatively little effort. In any case we will have to evaluate which parts are the most susceptible to being improved given their prominence or visibility in the finished model.

Getting started

Before we start we must pay special attention to the instructions sheet, painting schemes, and in general to all the documentation that is inside the box.

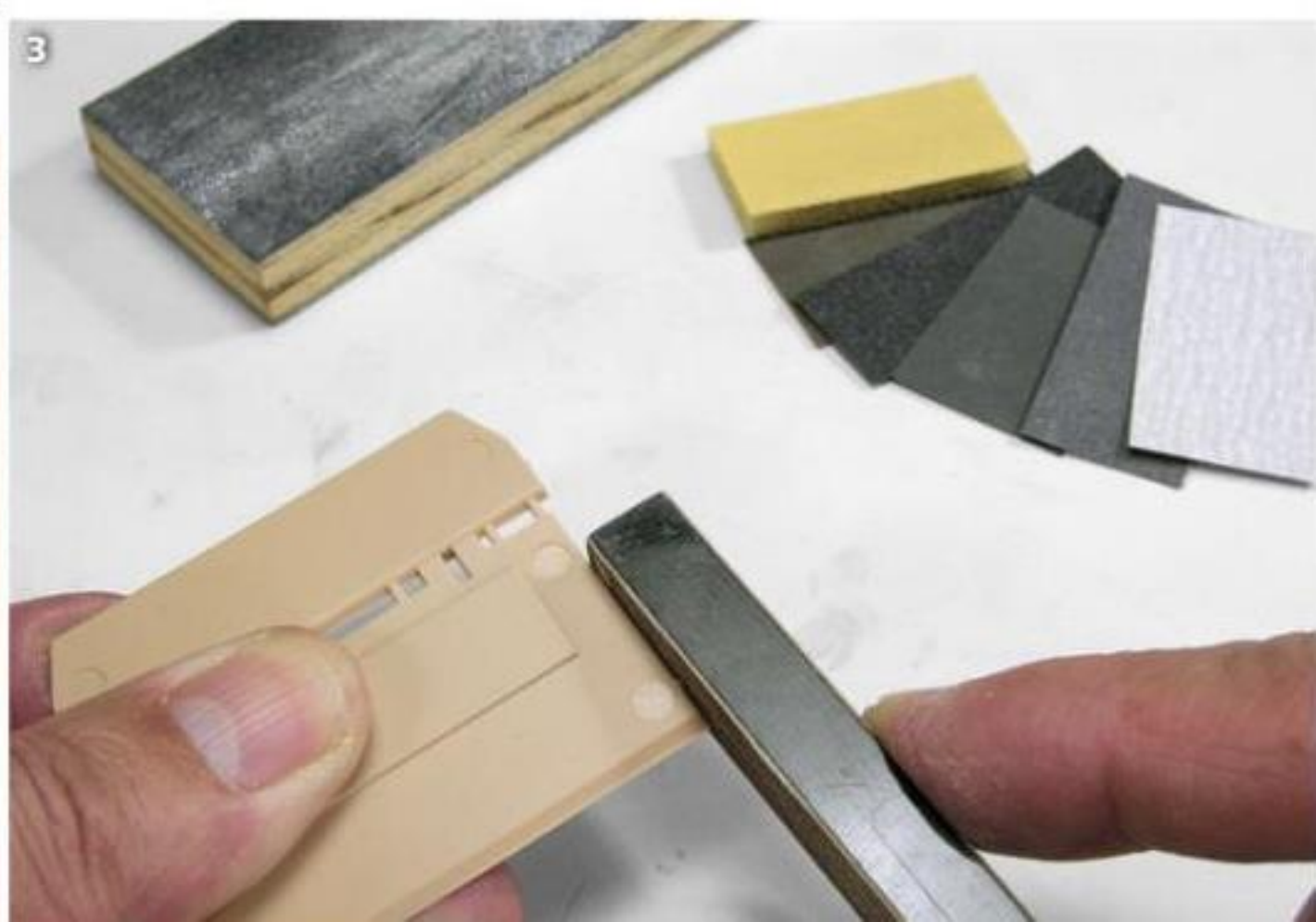
Assembly instructions usually include a representation of the sprues with all the parts. If we want we can do a check if any are missing.



(1). Once we have checked the box and verified that no parts are missing, we can start with the assembly following the instructions. To separate the parts from the sprue we will use some small cutting pliers. We must pay special attention to the smallest and most fragile parts as the cutting pliers can break them.

(2). With a sharp blade we remove the leftover plastic of the bridge between the sprue and the part, taking care not to cut into the actual part or our own fingers.

(3). Next we smoothen the surface with a sandpaper or a thin file. We must have a good range of tools for all kinds of tasks and finishes.

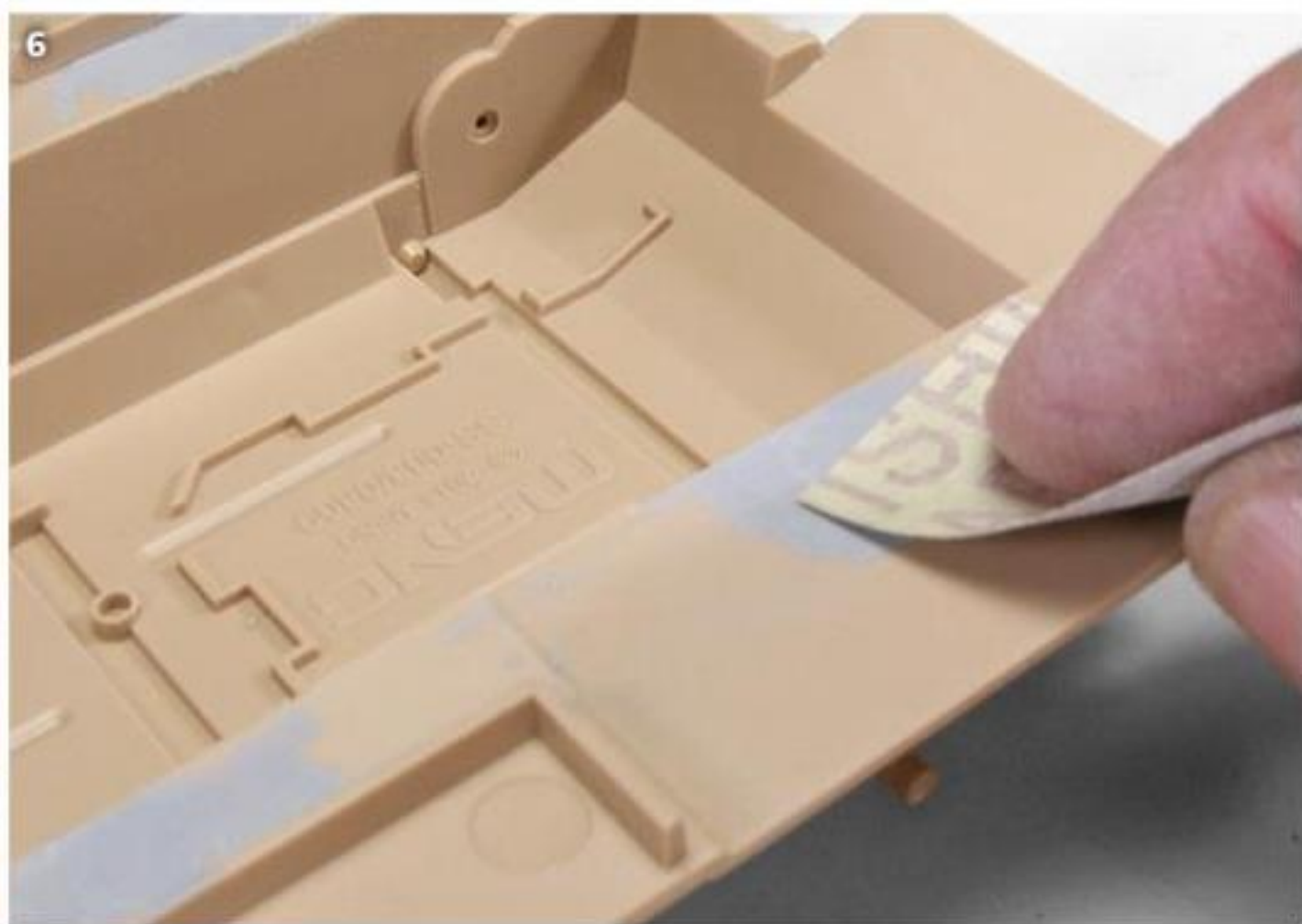




(4). The ejector pins and mould marks should also be removed.

(5). If sandpaper doesn't suffice we can try to fill them with putty applied with a spatula.

(6). Finally, once the putty has dried, we will smoothen the surface with fine sandpaper.



(7). The surface is now ready for painting.

(8). The best tool to glue plastic is liquid adhesive. It melts the plastic guaranteeing a strong and lasting bond. It also works by capillarity so it is enough to join the parts together and then apply the adhesive along the joint.



Weapons

Due to the manufacturing process, cylindrical parts made in plastic tend to have a moulding line along the surface. This seam is nothing more than the union line between the two parts of the mold. The first improvement to be made on any weapon will be the removal of this seam. We can use a blade and some soft sandpaper.



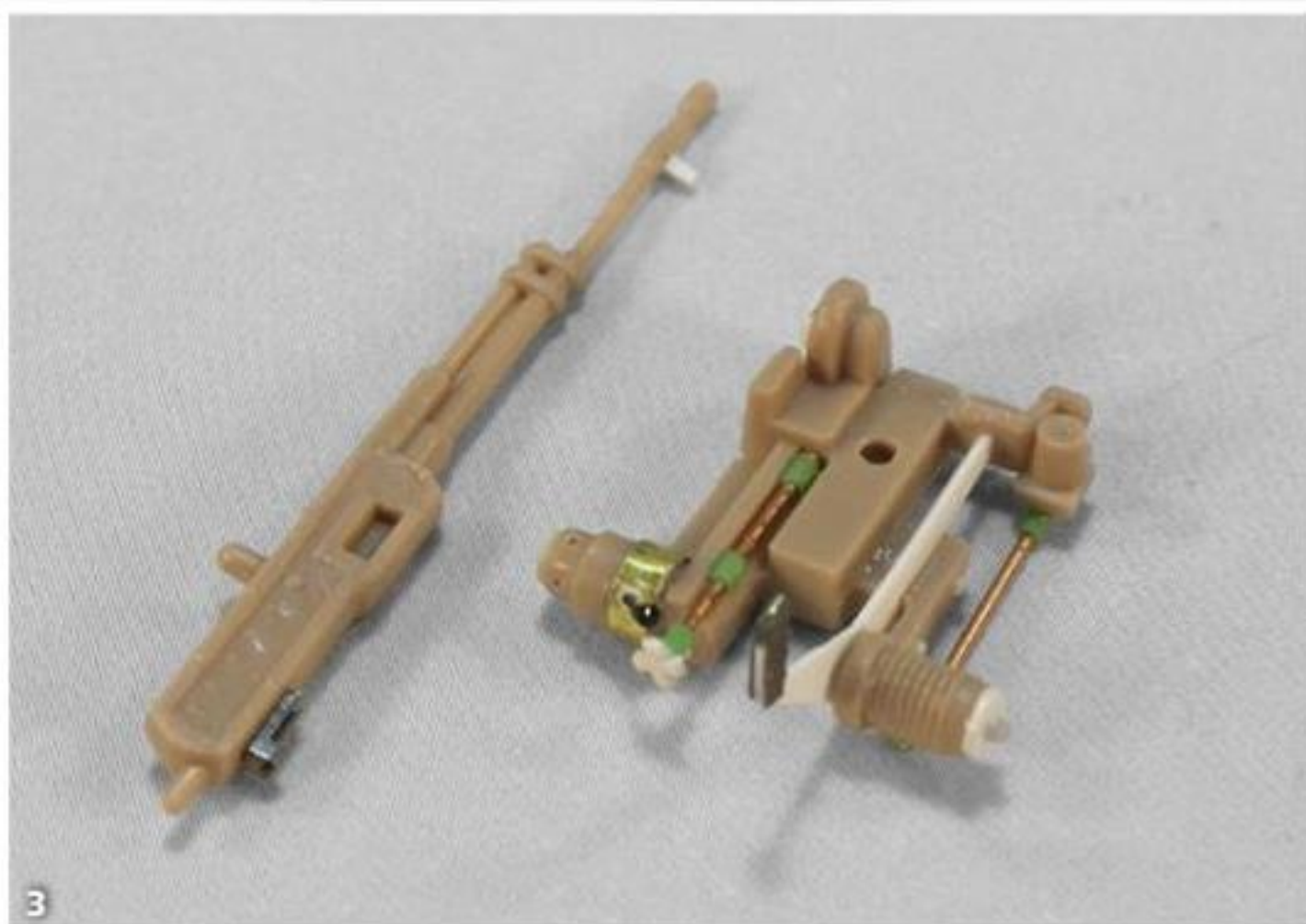
(1). Whenever the size of the object allows, we hollow the tube. We can use a drill of a suitable diameter or even a file.

(2). The detail of this machine gun includes photo-etch parts and a multitude of home-made improvements with copper wire, copper sheet and plasticard. We will need superglue (cyanoacrylate) to glue these parts, with the help of a piece of wire or needle.

(3). We also drilled out some holes in the left side of the bracket with a thin bit. The black lever is stretched sprue and the white tightening handle is fine plastic sheet.



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(4). The bracket of the machine gun has been made with copper sheet. In addition, the entire arm and base has been rebuilt with brass tubes of different size and with plastic.



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(5). The bracket of the ammunition box and the sights are photo-etch parts.



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(6). Plastic rivets made with the 'Punch and Die' (see chapter on rivets) have also been added to the bracket. The best way to glue them is to use liquid adhesive applied with a fine brush.

(7). The bracket is a PE piece that has been detailed with a square-shaped sheet of plasticard and four commercial plastic nuts. It is advisable to have a good assortment of nuts and rivets as they come handy on numerous occasions.

(8). With the detail of both the bracket and the machine gun, we considerably improve the general look of the vehicle.

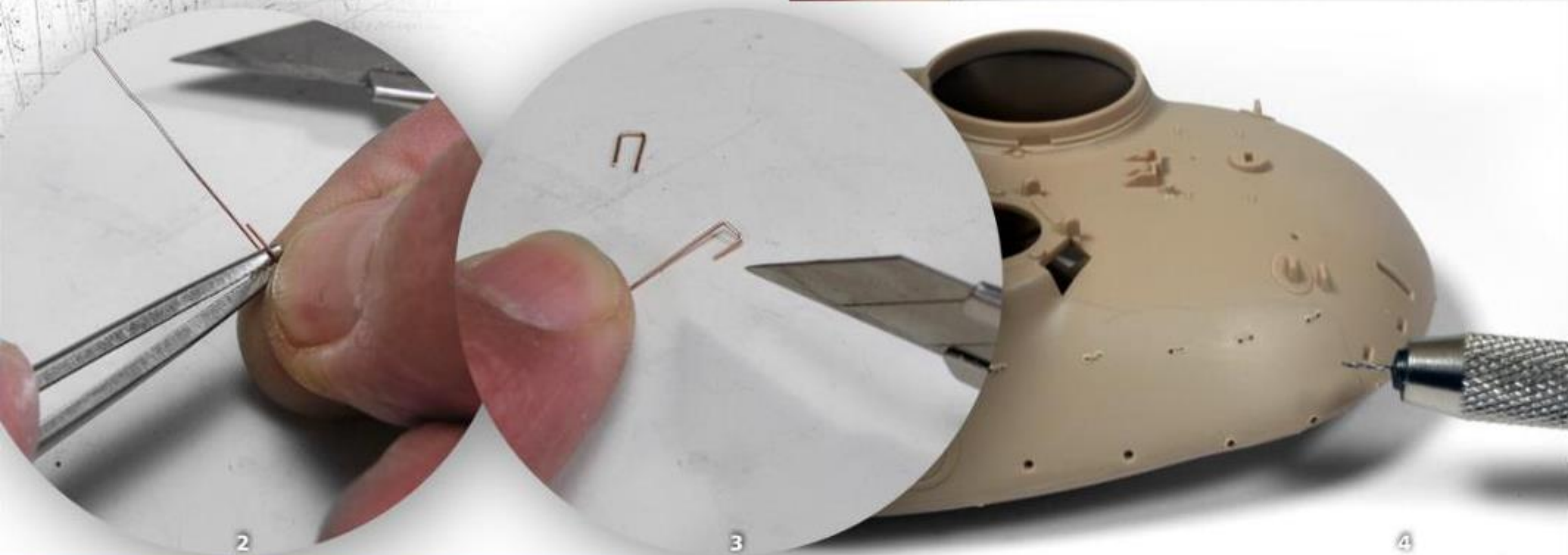
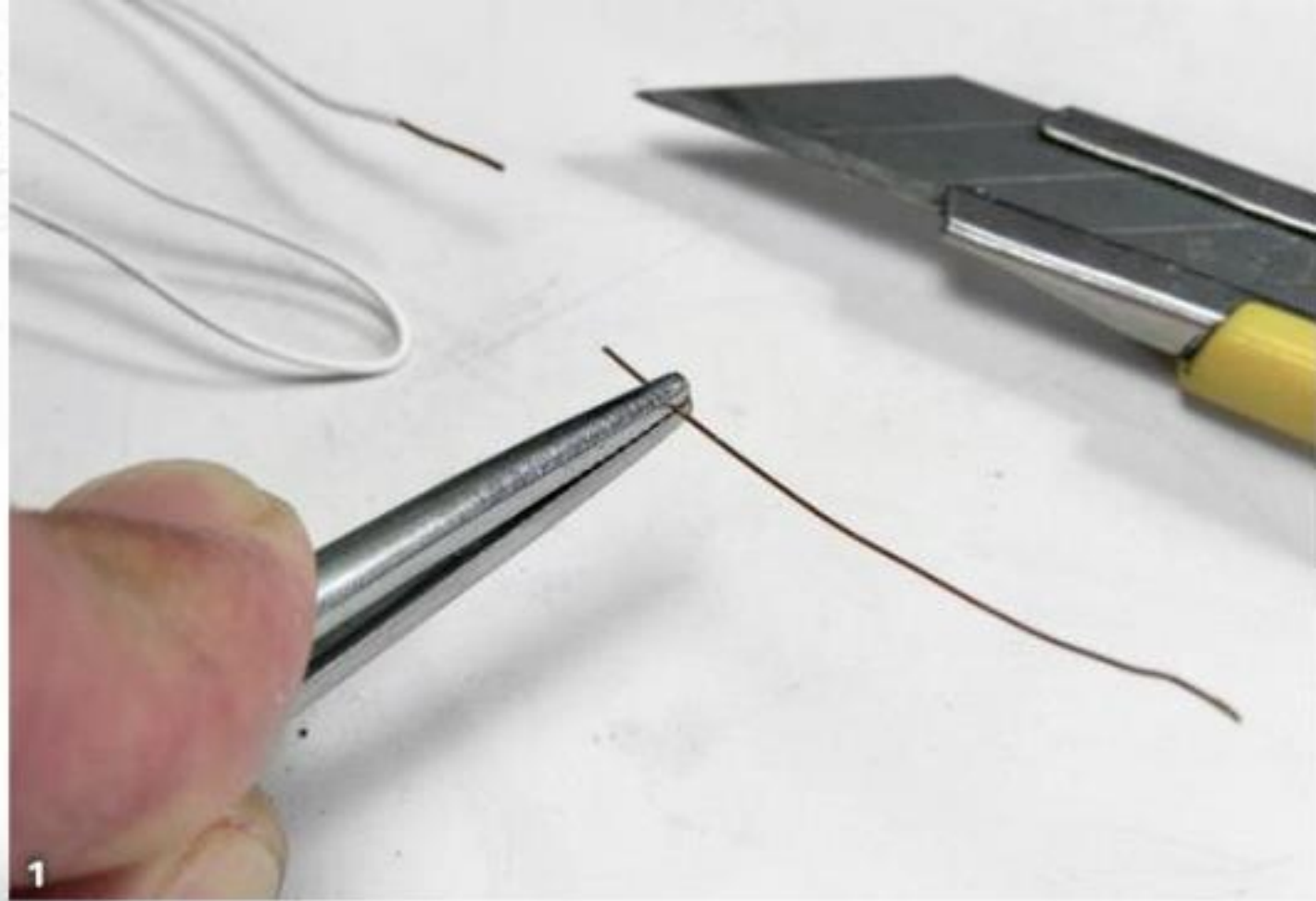
(9). Regarding weapons, there is another considerable improvement that consists in replacing the original gun barrel by a turned metal one. Although it is a simple piece, composed of two halves in many cases, getting the gun barrel nice and smooth can be a real pain.



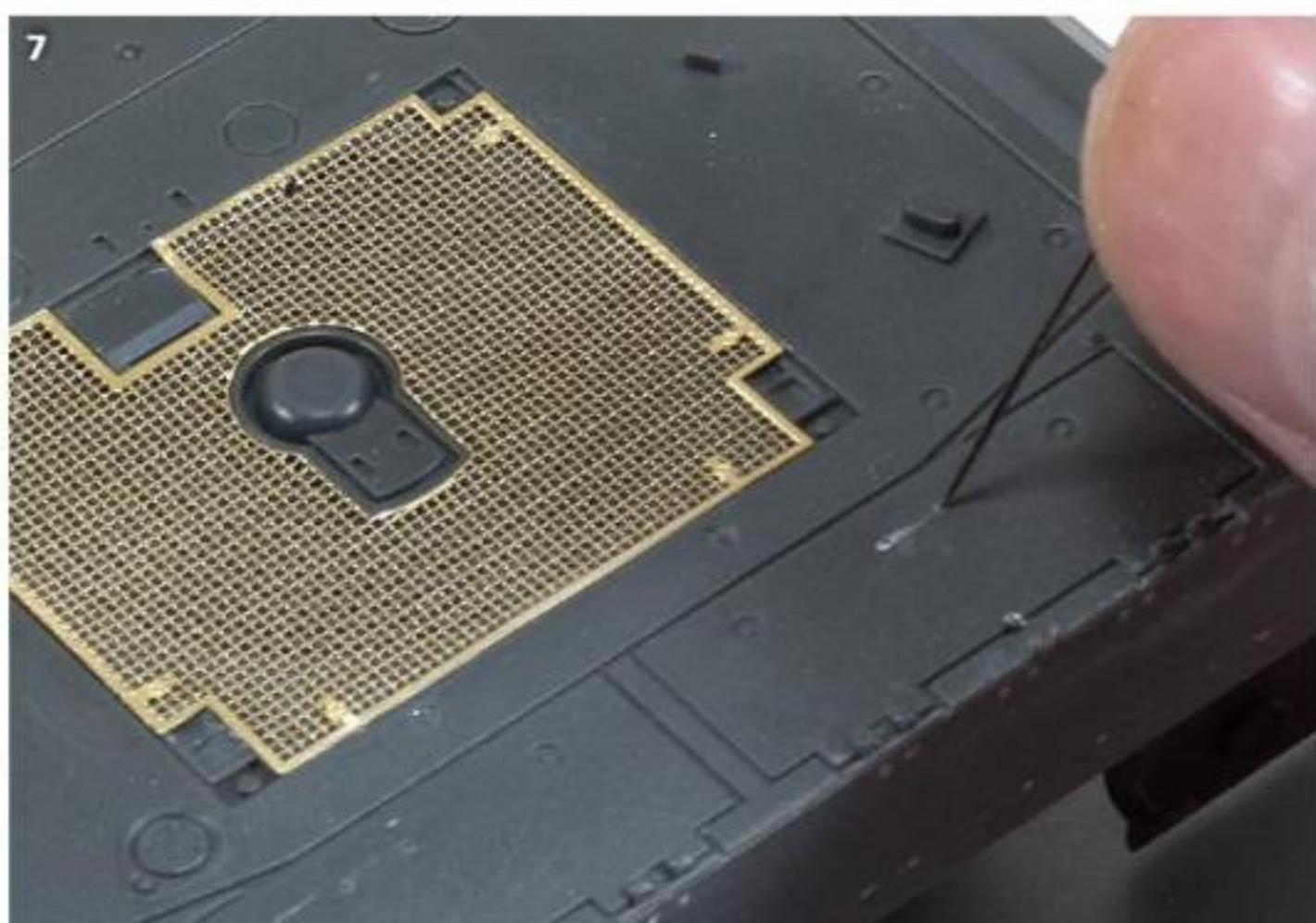
(10). Sometimes, an aftermarket gun barrel is a must due its complexity, and it comes with a lot more detail.

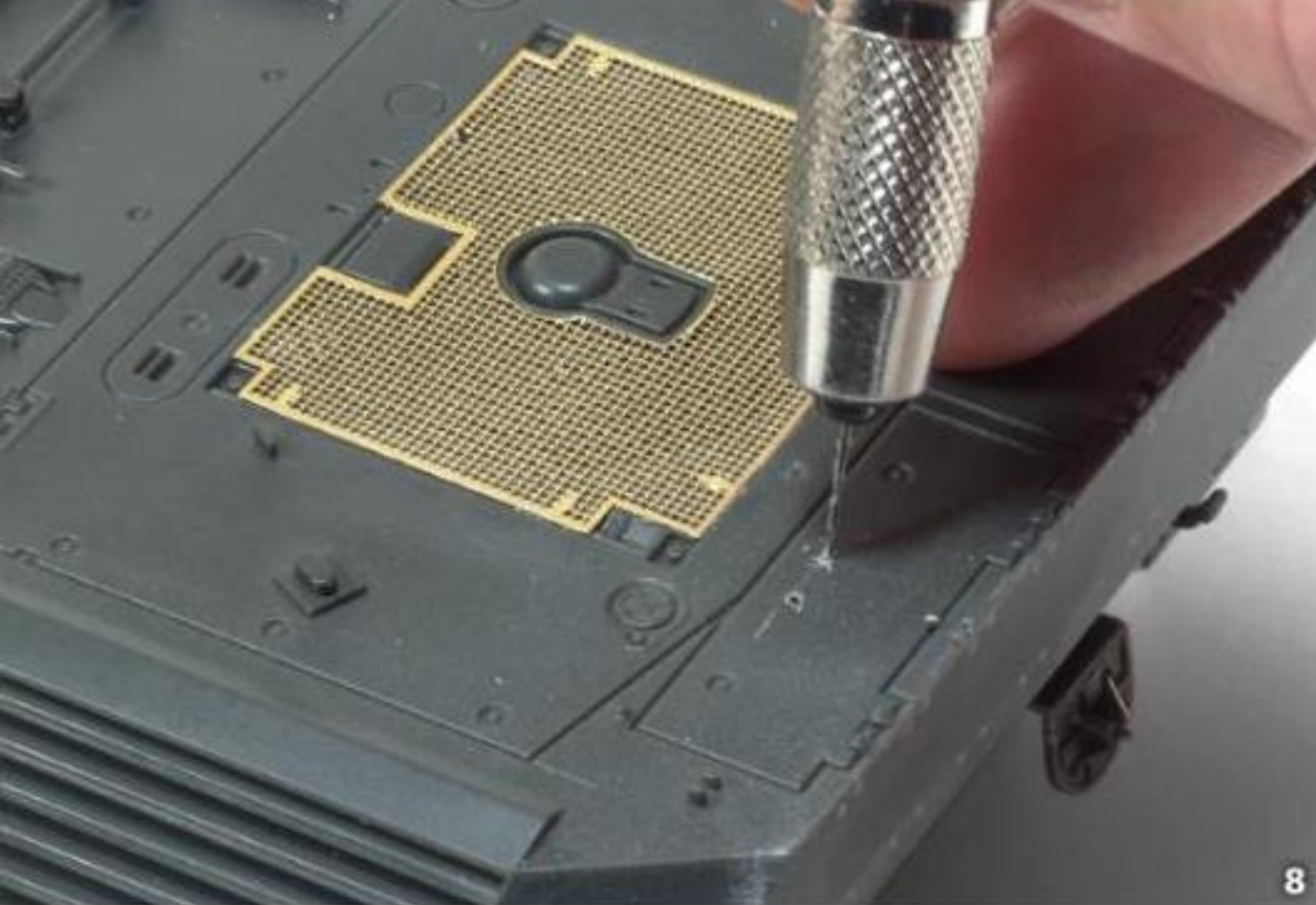
Handles

Like any other cylindrical piece, the handles also have burrs that should be removed. Because they are often very thin, fragile and with peculiar shapes, it may be more convenient to replace them by others made with wire of the appropriate thickness.

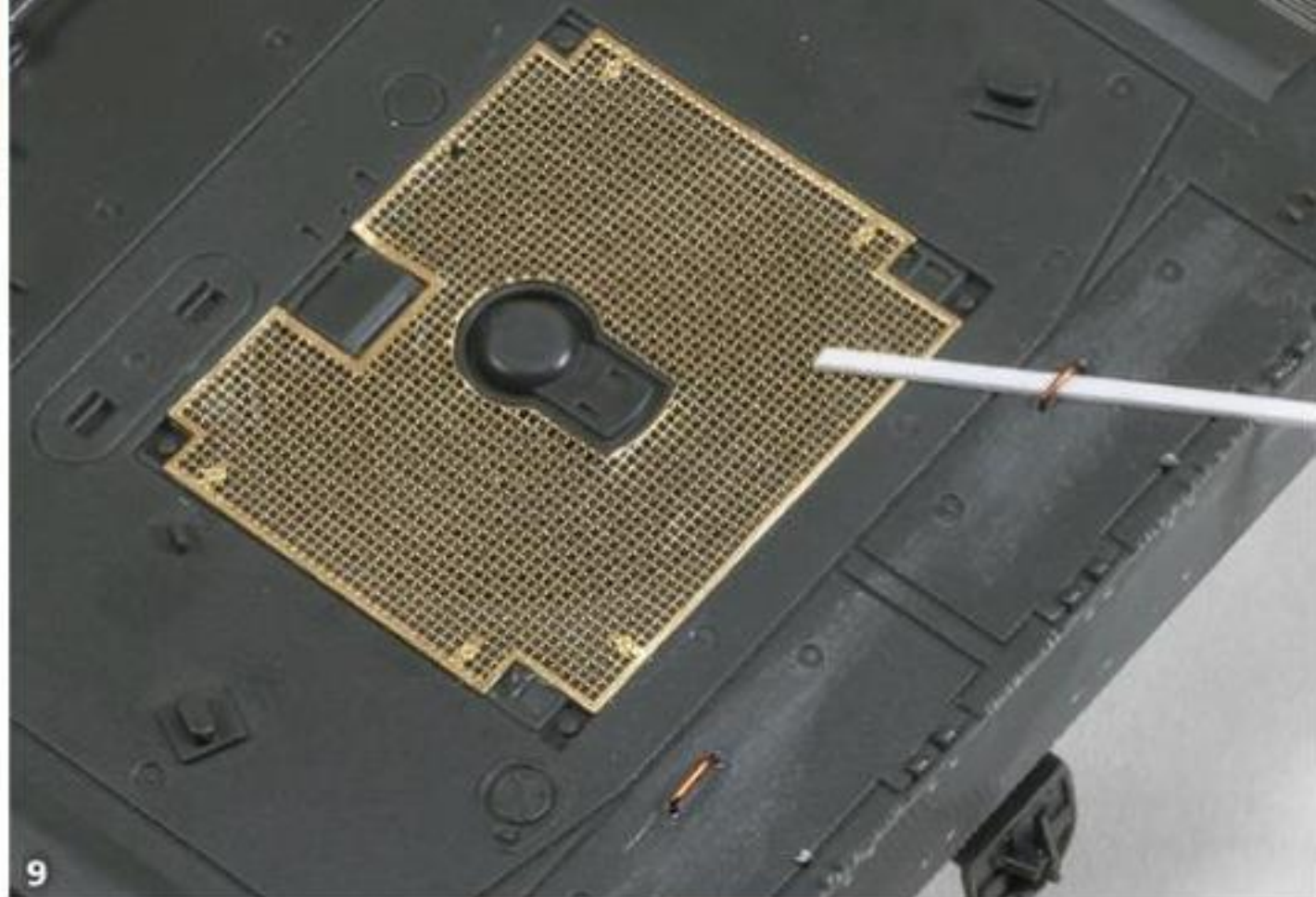


- (1). We only need copper wire or similar, a blade and flat pliers.
- (2). Clamp the wire between the tweezers and bend both ends with your fingers in the same direction.
- (3). Now we just have to cut the two sides of the handle more or less to the same length.
- (4). We make two small holes where the handles will be placed with a drill bit of the same thickness as the wire.
- (5). Once in place the handles should be fixed with superglue. In addition to glueing them, the glue will fill the rest of the hole and simulate welds.

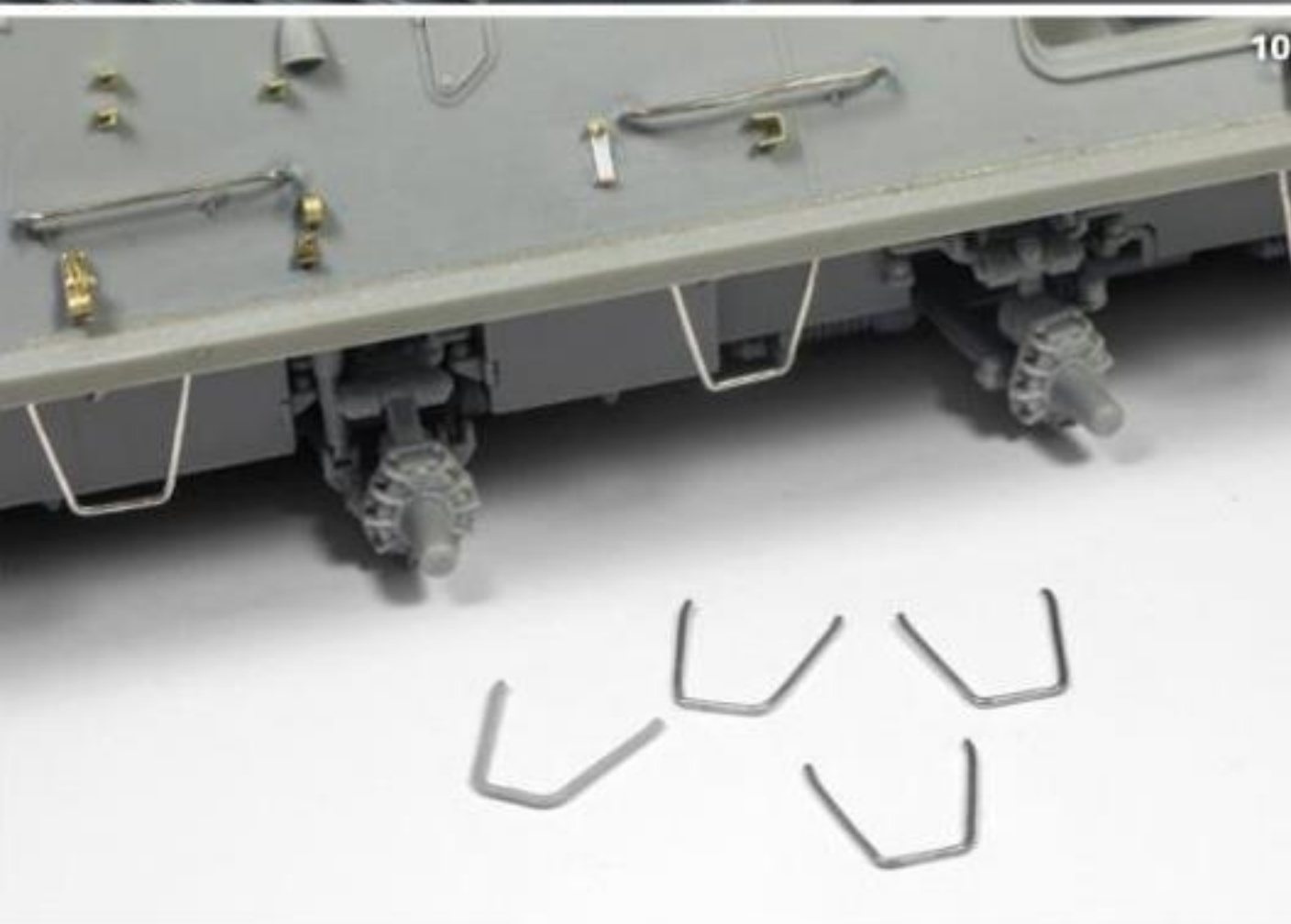




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(6). On other occasions when the position allows it, it is advisable to remove the handles with the help of a blade.

(7). To improve the accuracy when drilling, you can mark the surface with a needle or punch.

(8). The surface is then drilled more easily.

(9). To have all the handles at the same depth, you can use a plastic strip as a guide.

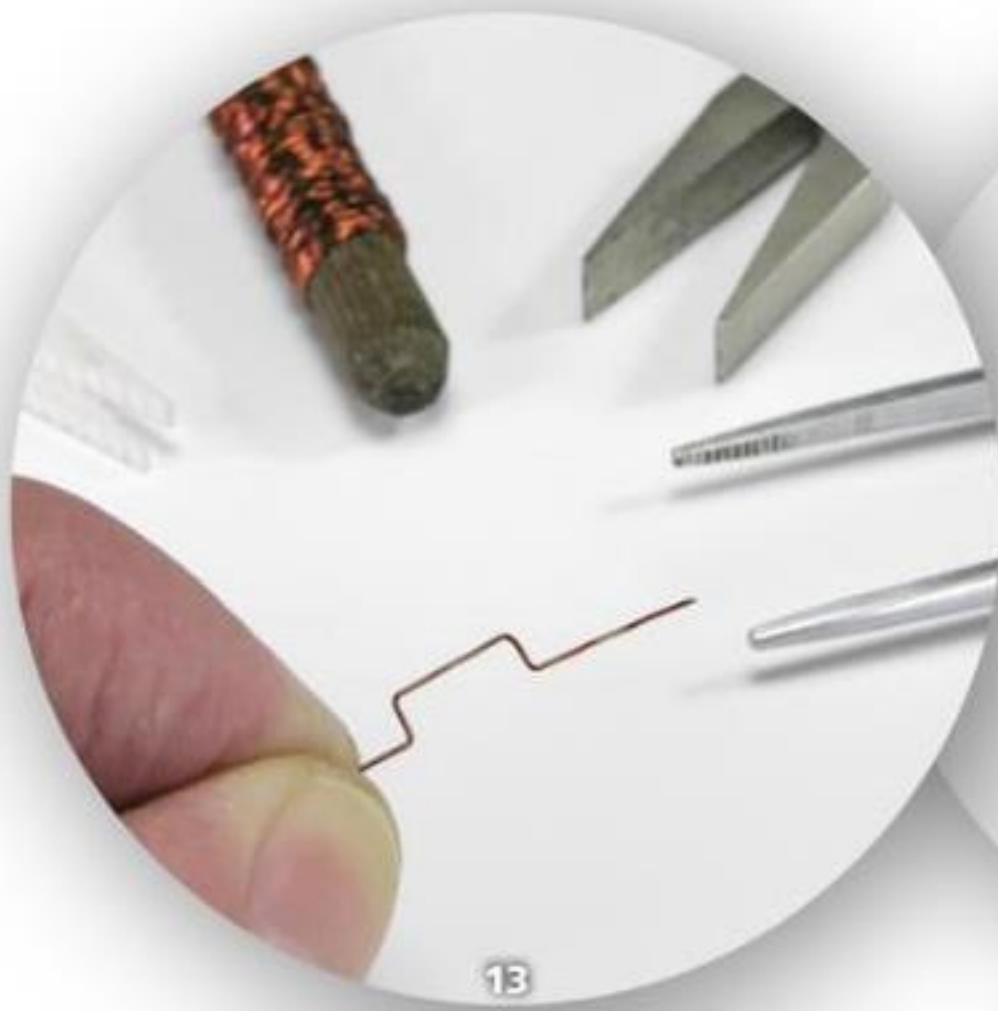
(10). Note the difference between the original plastic handle on the left and those made with wire, much more resistant and credible.

(11). In this example, we also use the cover of the wire so we get an increased thickness.

(12). We can also replace the fastening loops for the canvas of all kind of trucks.



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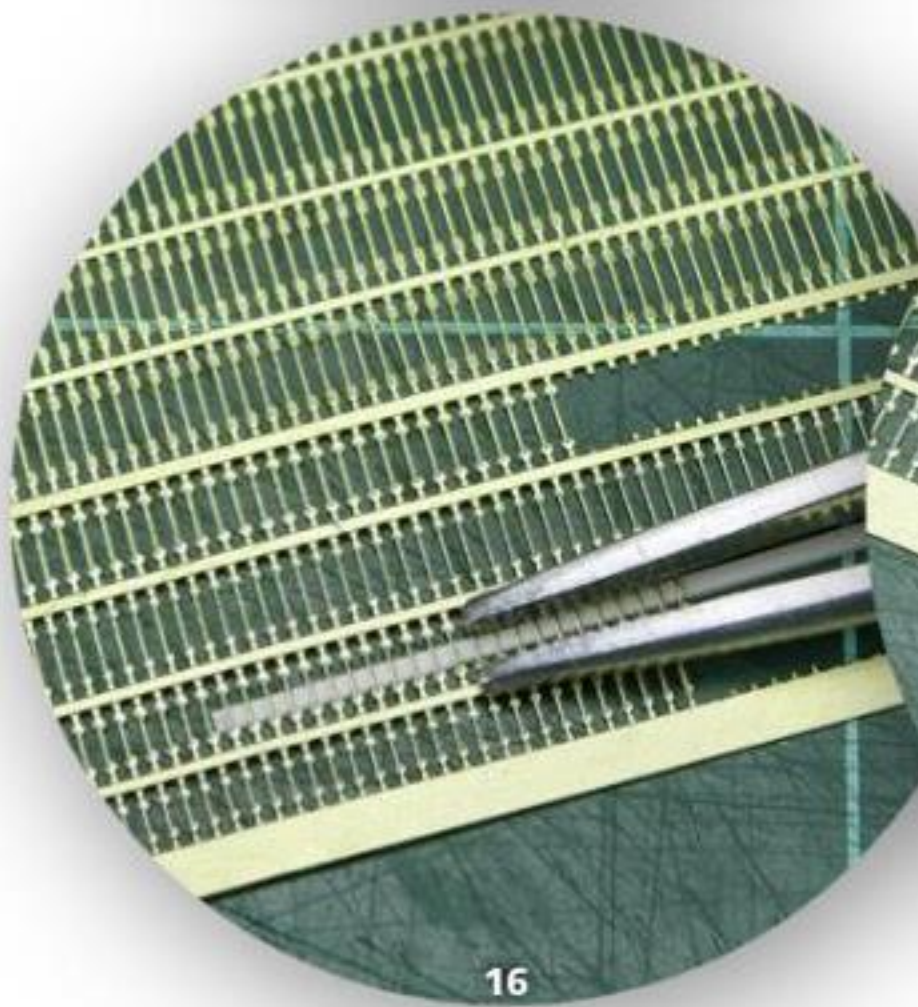
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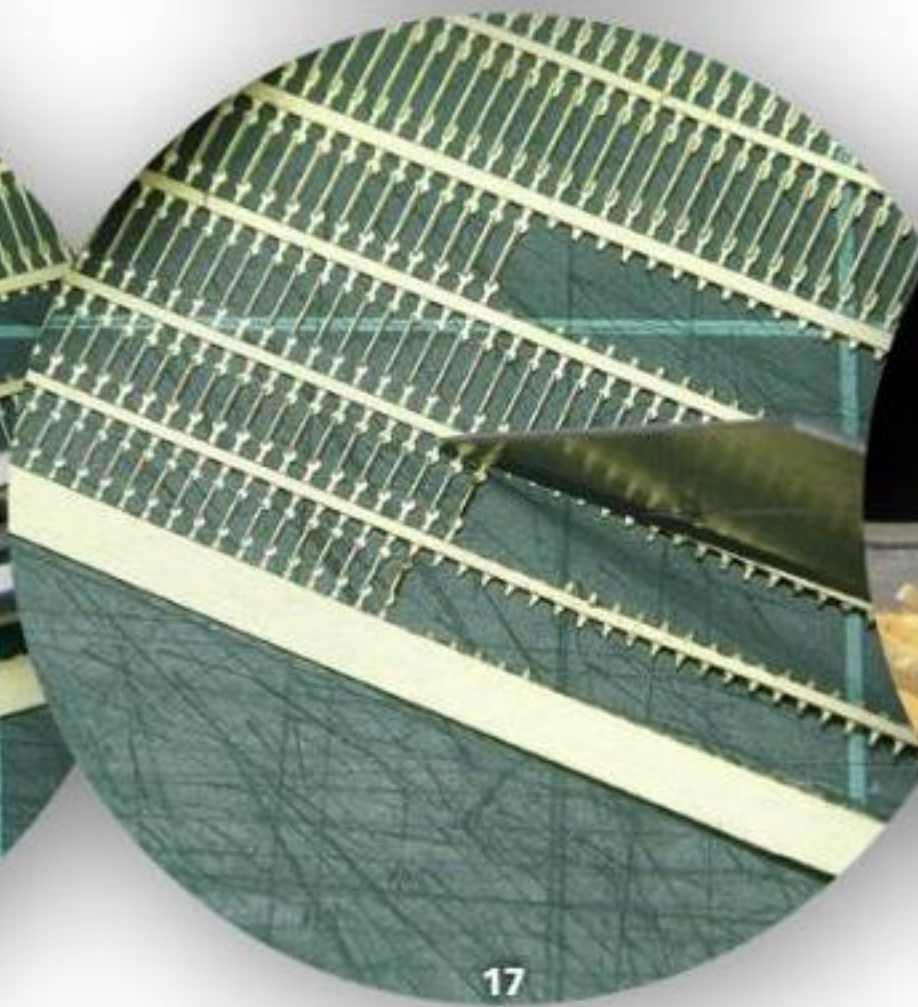
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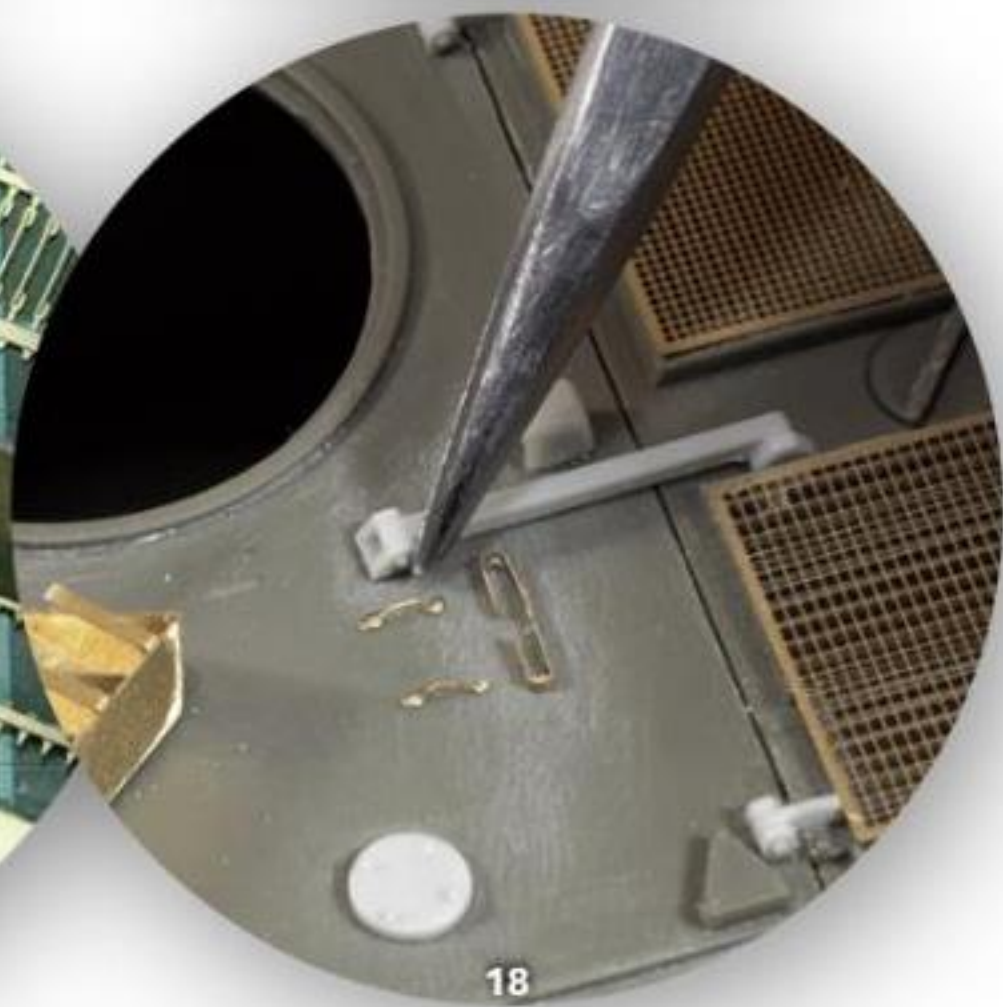
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(13). With a simple trick you can make the flat base of each end of the handle or similar. First we will shape the wire that should be quite ductile.

(14). Next with a pair of pliers we apply pressure on the edges.

(15). To get the proper shape we cut with a blade.

(16). We can also replace the handles used to attach the stowage to many modern vehicles. We use a PE set with several sizes. To shape them we can use a piece of square rod and apply pressure with tweezers.

(17). Then with the blade we proceed to remove them.

(18). Finally with the help of the tweezers and cyano we glue them in place.

(19). In addition to the various types of handles for hatches, we can also replace all kinds of brackets like the rangefinder cover on this vehicle. The original brackets are usually oversized so we must replace them.



19

18

Towing cables

The replacement of the handles is often a must. Towing cables usually can not be installed until a lot of other work on the model has been performed.

Sometimes it is almost impossible to shape plastic cables so their replacement is critical. We are forced to get a much more accurate set.



We can scratch this type of cables using wire of the suitable thickness. We wind up the threads holding one end with our fingers and the other end with small pliers.



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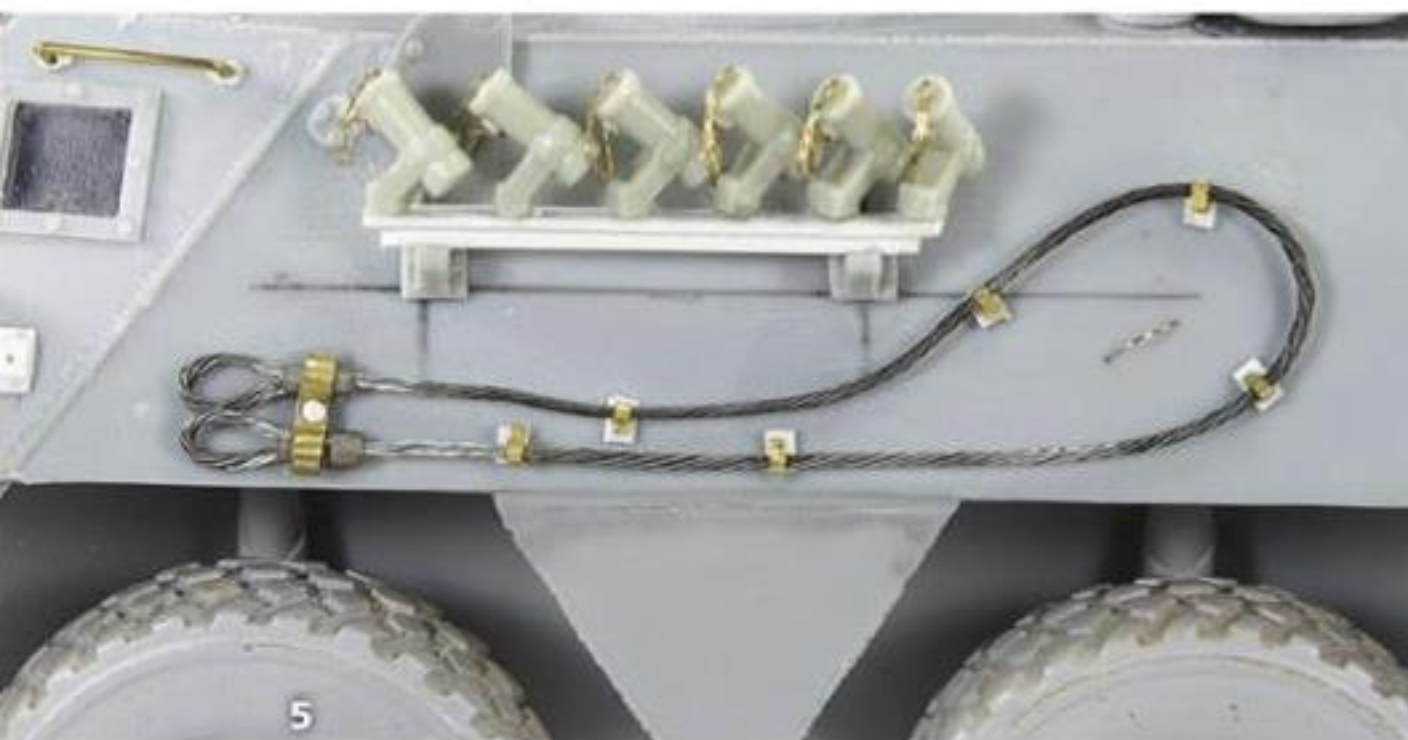


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We will try to make the braiding credible and as close as possible to a real one. Using different types of wire we can get cables of different types that we will insert into the own original heads or commercial resin or metal ones to complete.

We can also make different combinations and even add the fastenings.

The commercial alternative to scratch is wide and will always depend on our needs.



5

This is the look of a completely home-made cable that has been attached with great attention to detail.



6

Once the wire is cut to the appropriate length and we have added the heads we just have to wind up the cable and put it in place.

(7-8). In these two examples the cables of the winches have been made entirely with wire of various thicknesses and the original hook from the kit.



7



8

Wiring and conduits

In the same way that we have worked with the towing cables and with practically the same tools, it is very easy to add realistic wiring and conduits to some model parts.

The most critical ones are those placed in external lights and headlights. Sometimes the manufacturer represents them in plastic, moulded in the hull, so they should be removed and replaced.

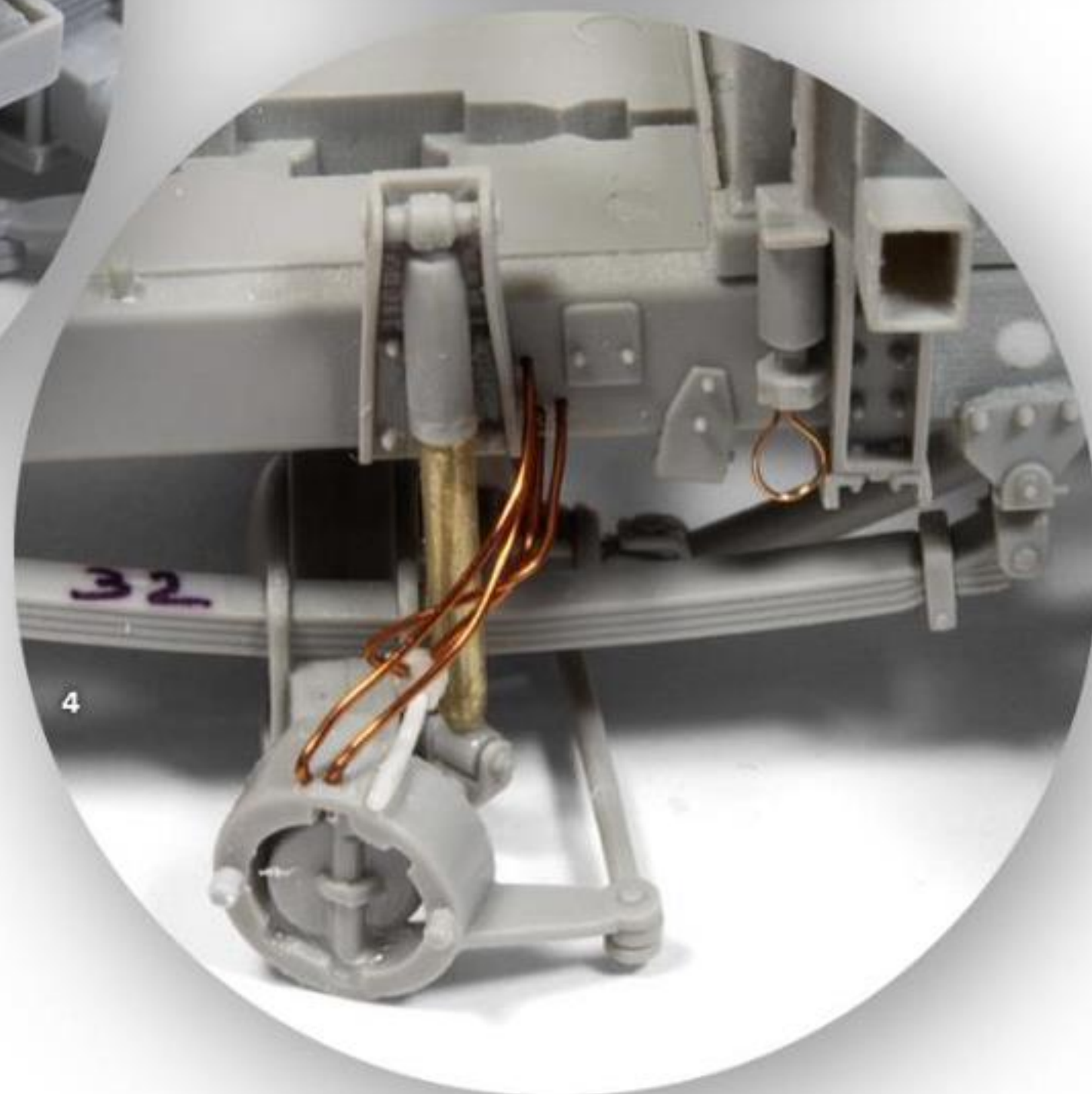
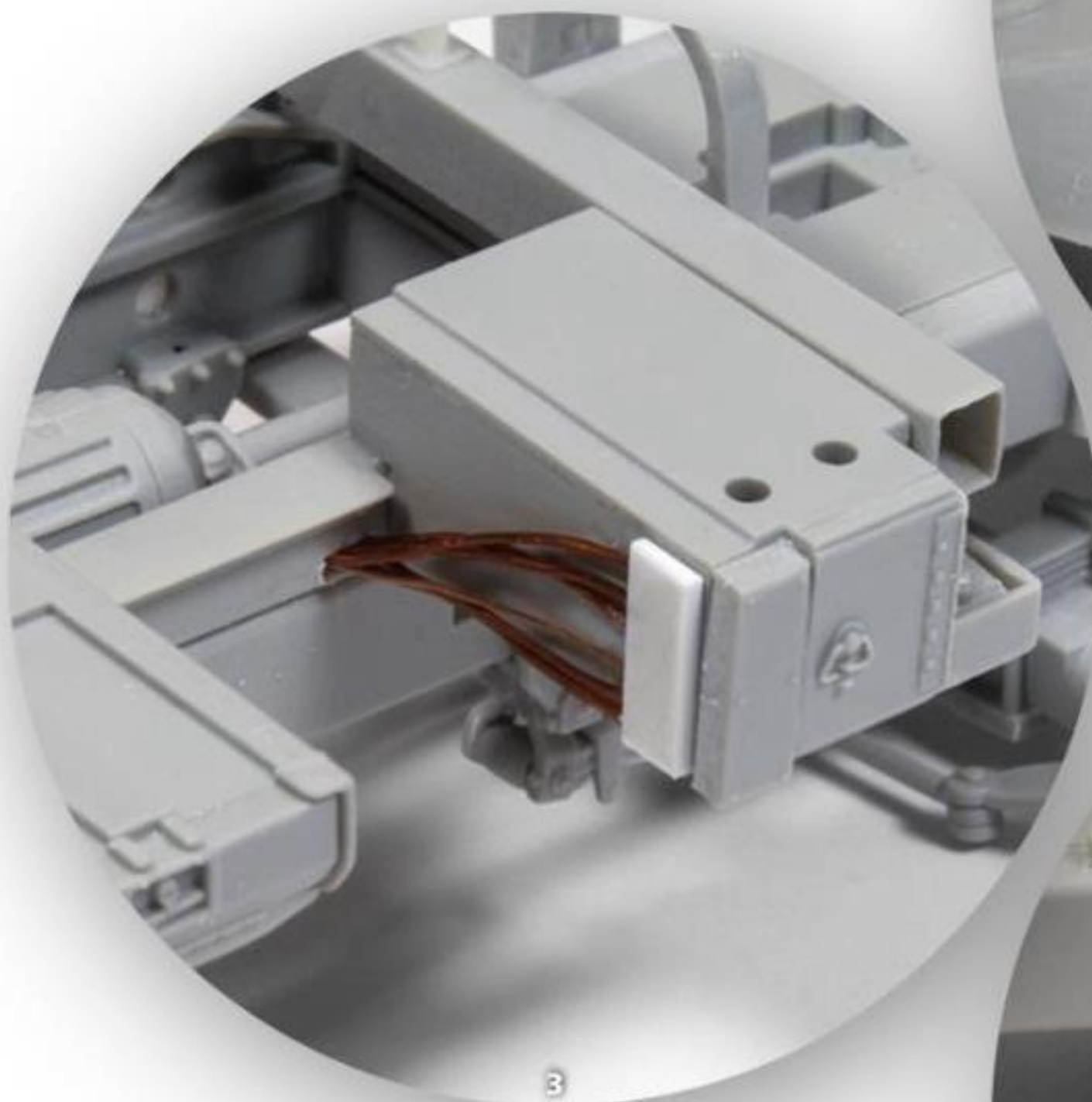
In addition, most modern and current vehicle kits include a multitude of electronic devices, hydraulics,..., but usually lack the wiring. Here we can come in to create a better representation.

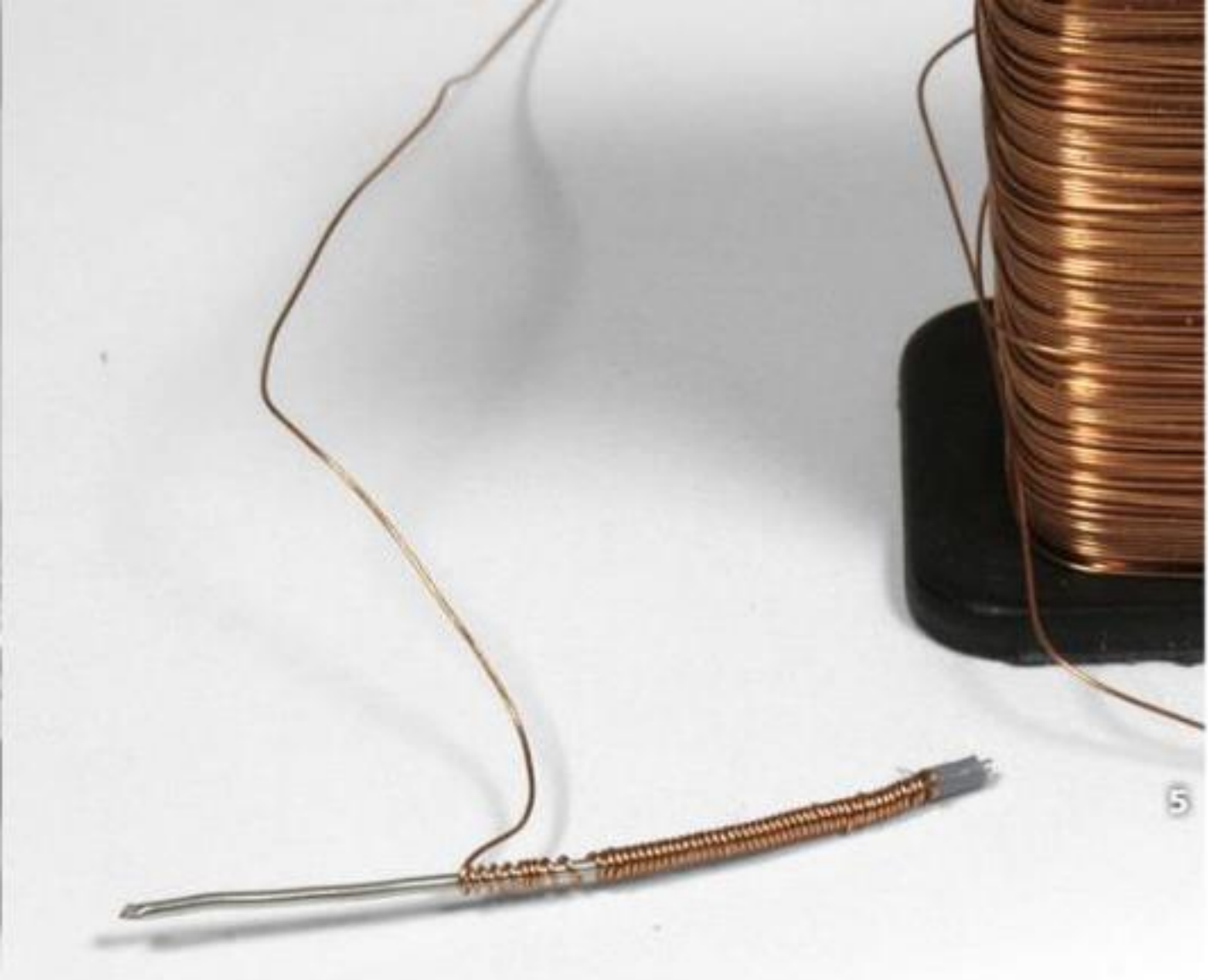
(1). The simplest way to fix them is to use the original end points, drill a hole, insert the cable and fix it with a drop of cyano.

(2). A very simple and efficient modification.

(3). With wire of different size and diameter we can improve any part.

(4). We can also represent hydraulic hoses, adding complexity to the final assembly and improving the final look.



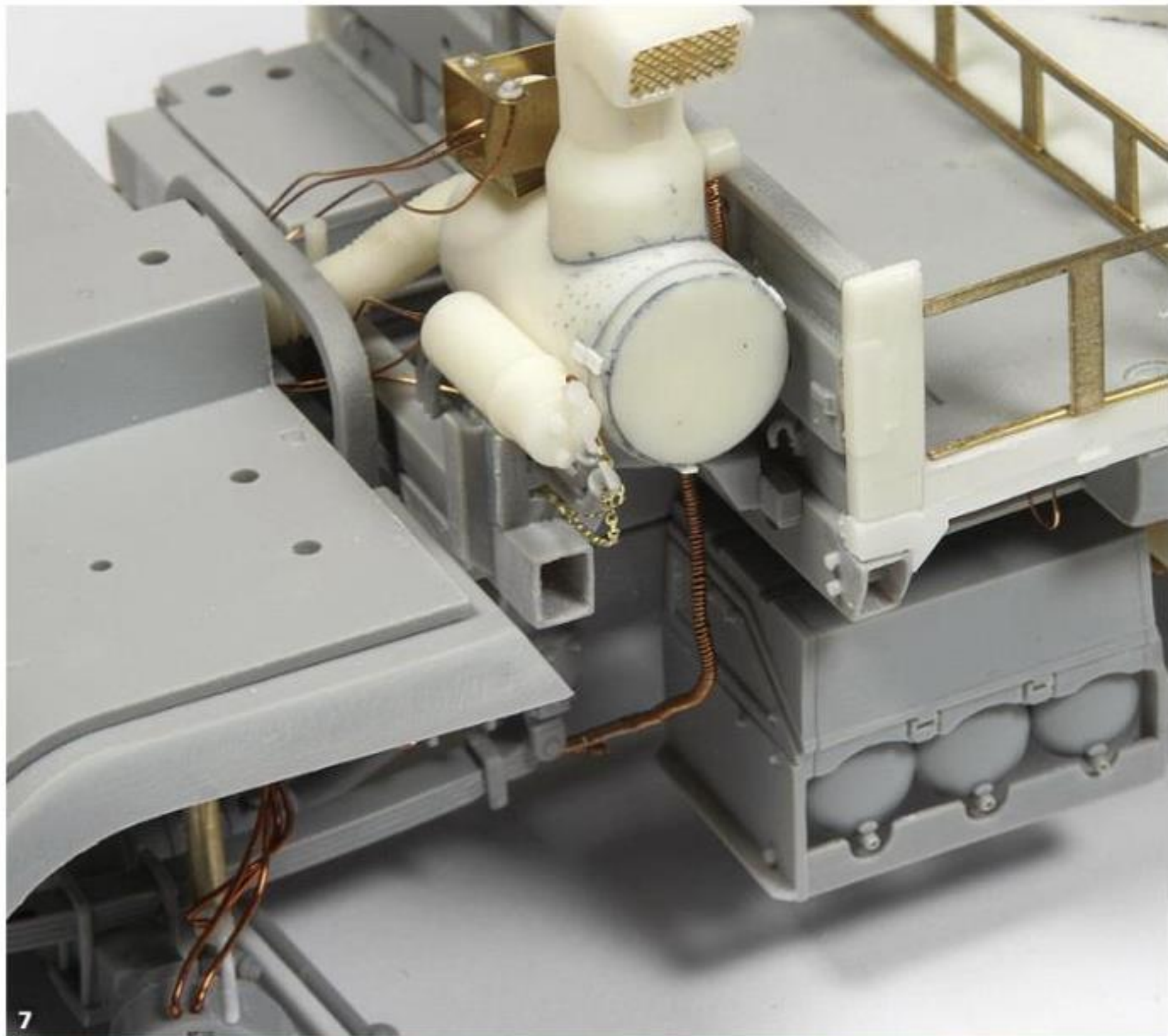


(5). To make a flexible duct we can use a piece of wire plastic or even the original part that we use as a base. We wind thin wire around it, pressing each loop to the base.

(6). Comparing the original piece and the own creation we can see a clear difference that will become even more evident once painted.

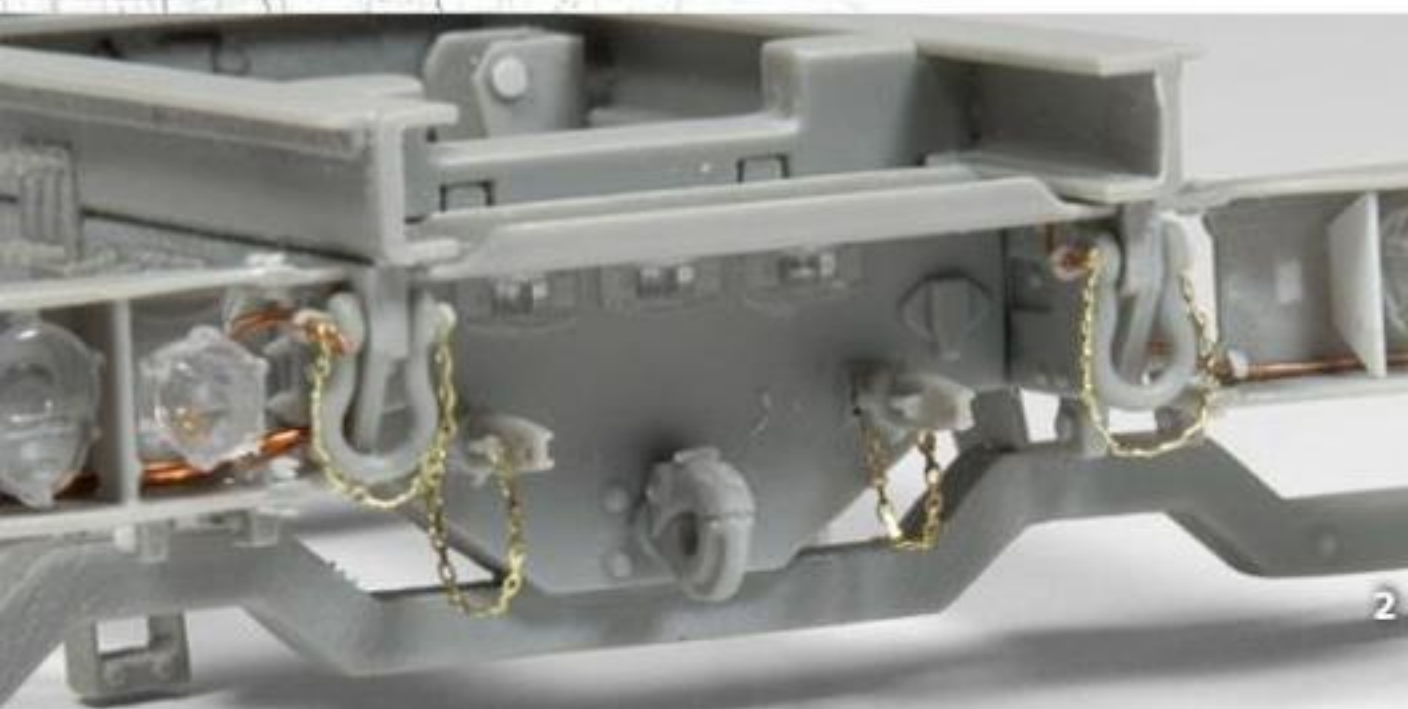
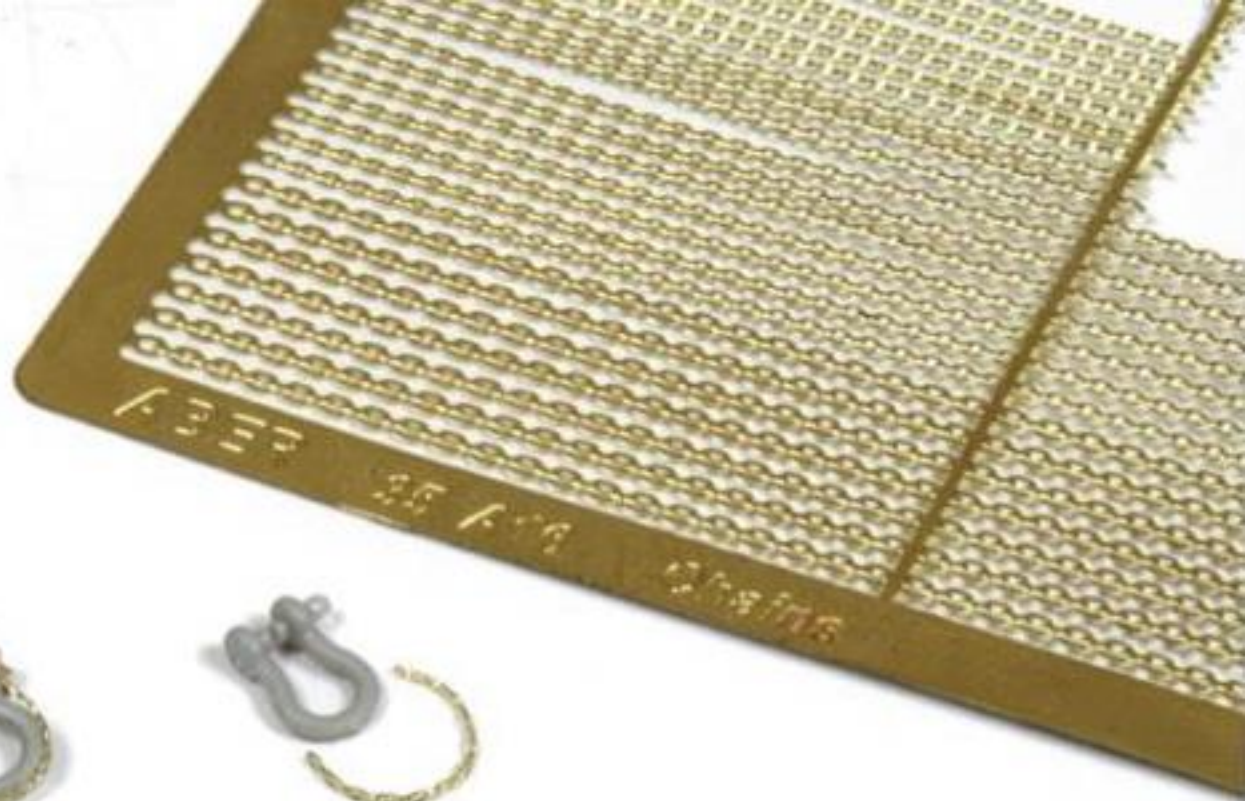
(7). This type of modification adds a lot of realism to the final assembly.

(8). Also susceptible to change are the fuel system conduits used in many heavy vehicles.



Metal chains

Many caps, plugs and other pieces include chains to prevent them from getting lost. These details are nearly impossible to depict in plastic so they can be better reproduced in metal or photo-etch.



(1). On the hooks and towing systems, the pins usually are secured with a small chain to avoid their loss. There are specific photo-etch sets with chains of different sizes that can help us.

(2). If we want to add a more convincing look to the chain we can twist it a little so that it doesn't look completely flat. Once installed they really stand out and add much realism.

(3). Chains added to the caps of the smoke dischargers system improves the overall look of this vehicle.

(4). There are metal chains of different size and material available, larger than the photo-etch ones, perfect to be added to cargo vehicles or any other purpose.

(5). In this example are used to add the fasteners of the side shield plates of this vehicle.



Side skirt and fenders

Let's see how to add a series of home-made improvements, easy to make with plastic or brass sheet, and very attractive. In addition, even working on the original part, most of the times oversized, we will be able to give it a better look.



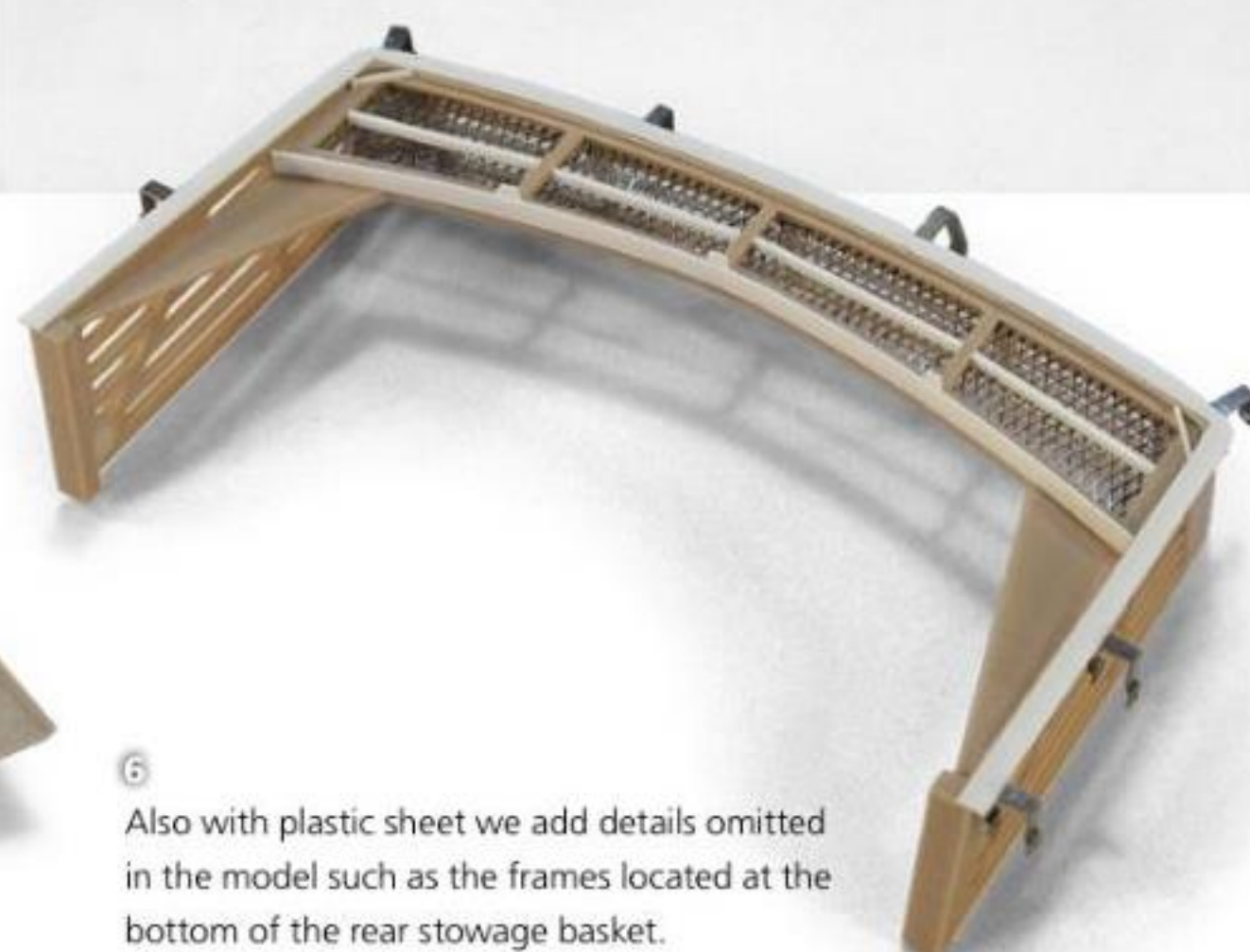
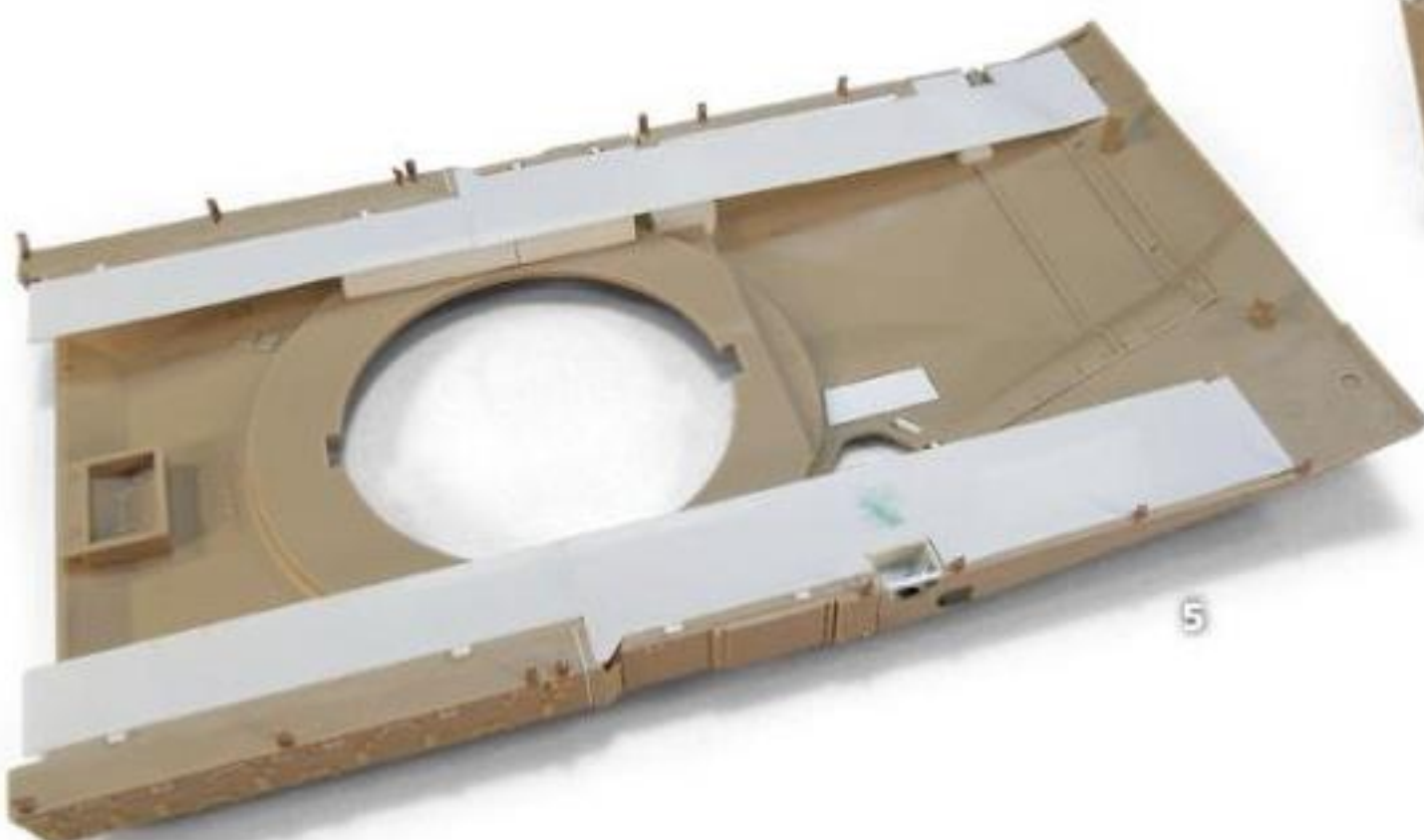
(1). Let's see how to rework in the original skirts to reproduce all kinds of battle damage. These parts depict rubber and metal.

(2). We are going to thin the piece in areas where we want to reproduce the damages using a mini-drill and metallic milling cutter. When we see that the part is thin and transparent enough, stop. If we continue, we will perforate it.

(3). The result, even on the original plastic, is much more convincing and doesn't need any more surgery.

(4). When the original part is simple, it is perhaps more convenient to replace it. We use plasticard of the suitable thickness. The metal skirts of this vehicle were a single oversized part.

(5). In old models there often is a the gap between the top and the lower part of the hull once the assembly is finished. To avoid this we can insert a piece of plasticard.



(6) Also with plastic sheet we add details omitted in the model such as the frames located at the bottom of the rear stowage basket.



(7). Another interesting improvement we can do to plastic is the replacement of rubber skirts. First of all we must remove them trying not to damage the main part.

(8). We use a blade to mark the parts that we want to replace. We try to work as much as possible on the inner side of the part to arrive at a good base for the replacement.

(9). Once all unwanted material has been removed we will need to trim the edges.



With a good file we try to match the cut and eliminate imperfections.



We keep the original part we have removed so we can use it as a pattern.



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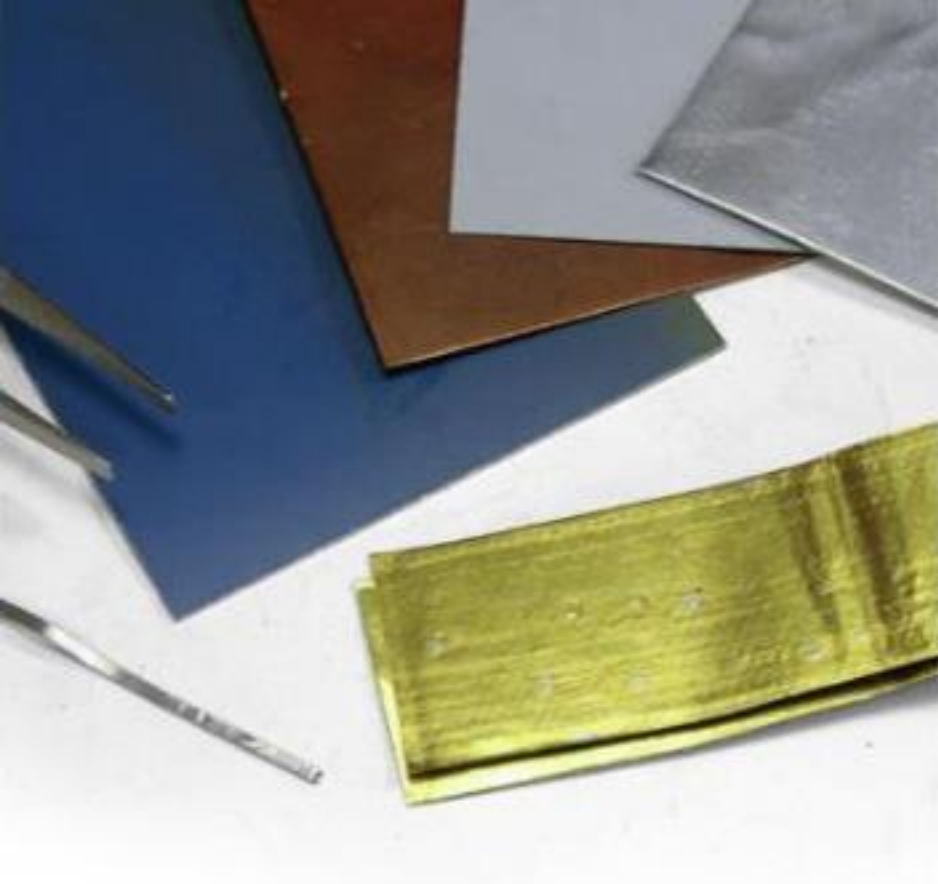


(12). Here we see similar part with oversized rubber skirts and excessively flat.

(13). The same part with the skirts made of plastic, much thinner and allowing some movement as they are individual pieces.

(14). Once placed on the model, they considerably improve its appearance. They are easy to handle and are fixed with liquid adhesive.





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(15). These kinds of modifications can be made with copper, tin or brass sheet. It is convenient to have several types and thicknesses.

(16). At the rear of this vehicle just one of the skirts has been reproduced. The advantage of metal is that we can reproduce bumps and dents.

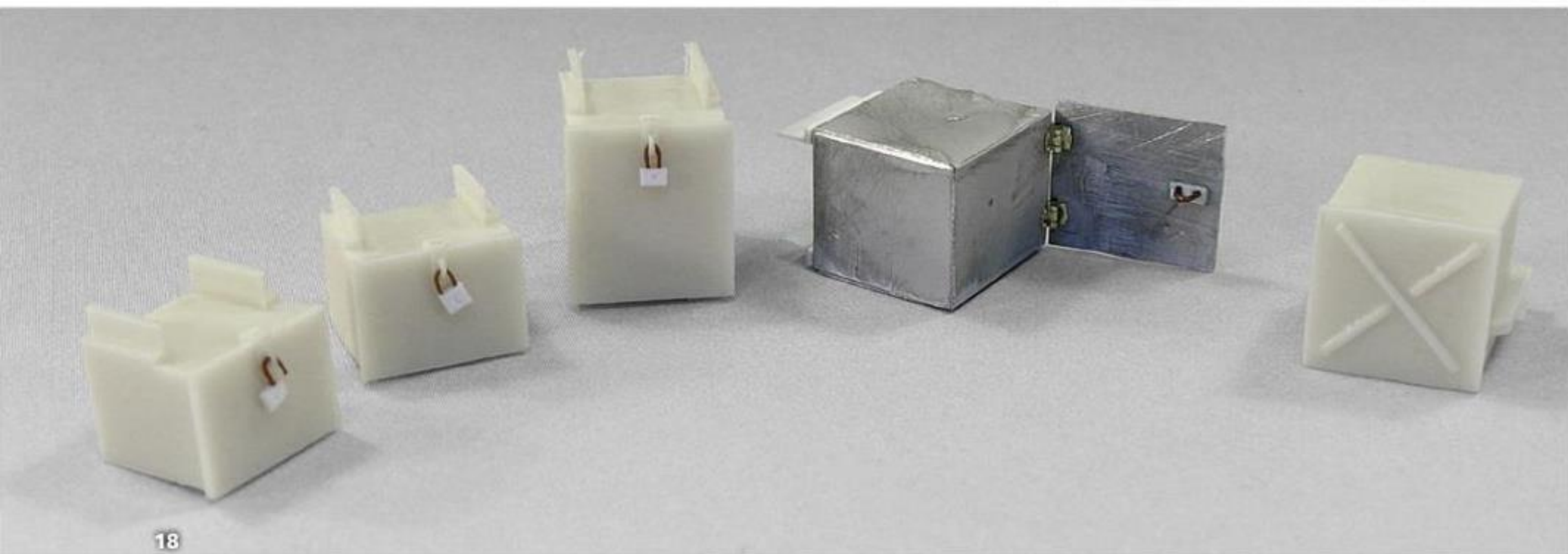
(17). The rim of this wheel reproduced in copper allows us to reproduce different dents. You must use cyano to glue it.

(18). A box with brass sheet and various materials was reproduced adding photo-etch hinges and plastic and copper wire.

(19). The properties of the material allow to reproduce with realism any type of bump or dent.

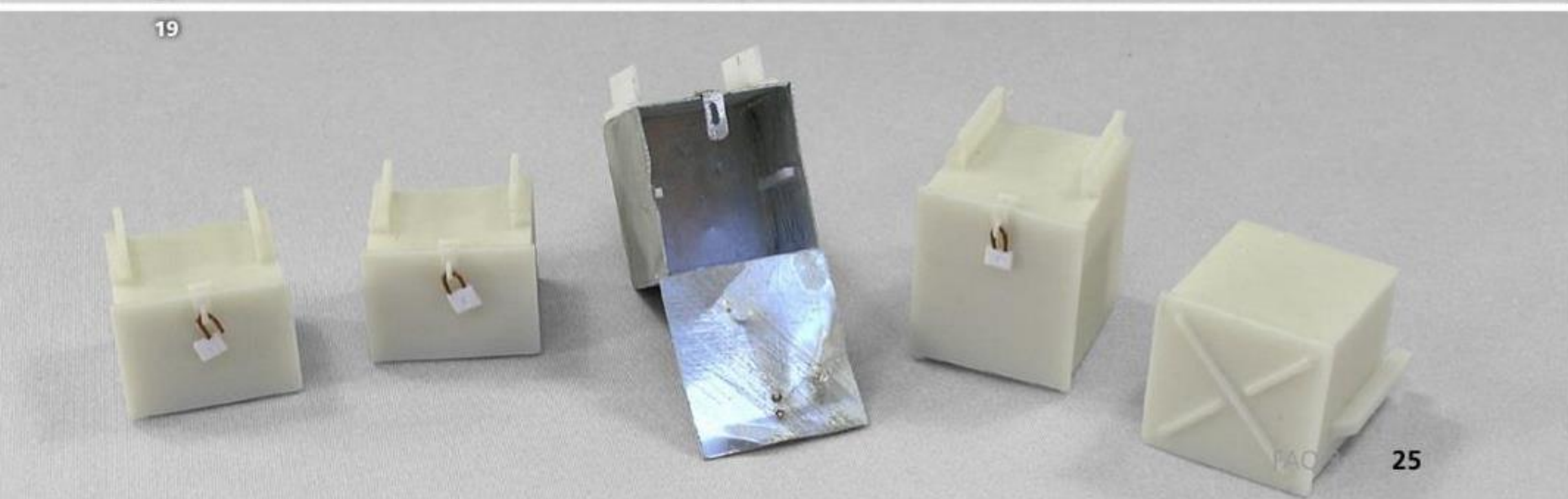


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Tracks

Another interesting improvement for our model is the replacement of the tracks by metal ones. Even though nowadays a lot of kits include plastic individual track links, the use of the metal ones has several advantages.

The main advantages are the effect of weight, the fact that they are workable and a greater ease of use when painting and placing them on the model. The main issue for some is their relatively high price. However, often the price is justified.

(1). The most common tools we need to assemble the metal tracks are a set of drill bits for metal, pliers, tweezers and cyano type glue.

(2). Usually the links are quite clean and do not need further treatment. In that case, the only thing required is the cleaning of the hole through which we will introduce the metal pin that will join them. For this we use the right size drill bit.

(3). With the flat pliers we straighten the wire to avoid any problem when introducing it through the hole in the links. Most of the time the wire supplied by the manufacturer is very thin. This tends to make the tracks loose over time. It is therefore advisable to replace it with a more solid one that will better preserve the original look.

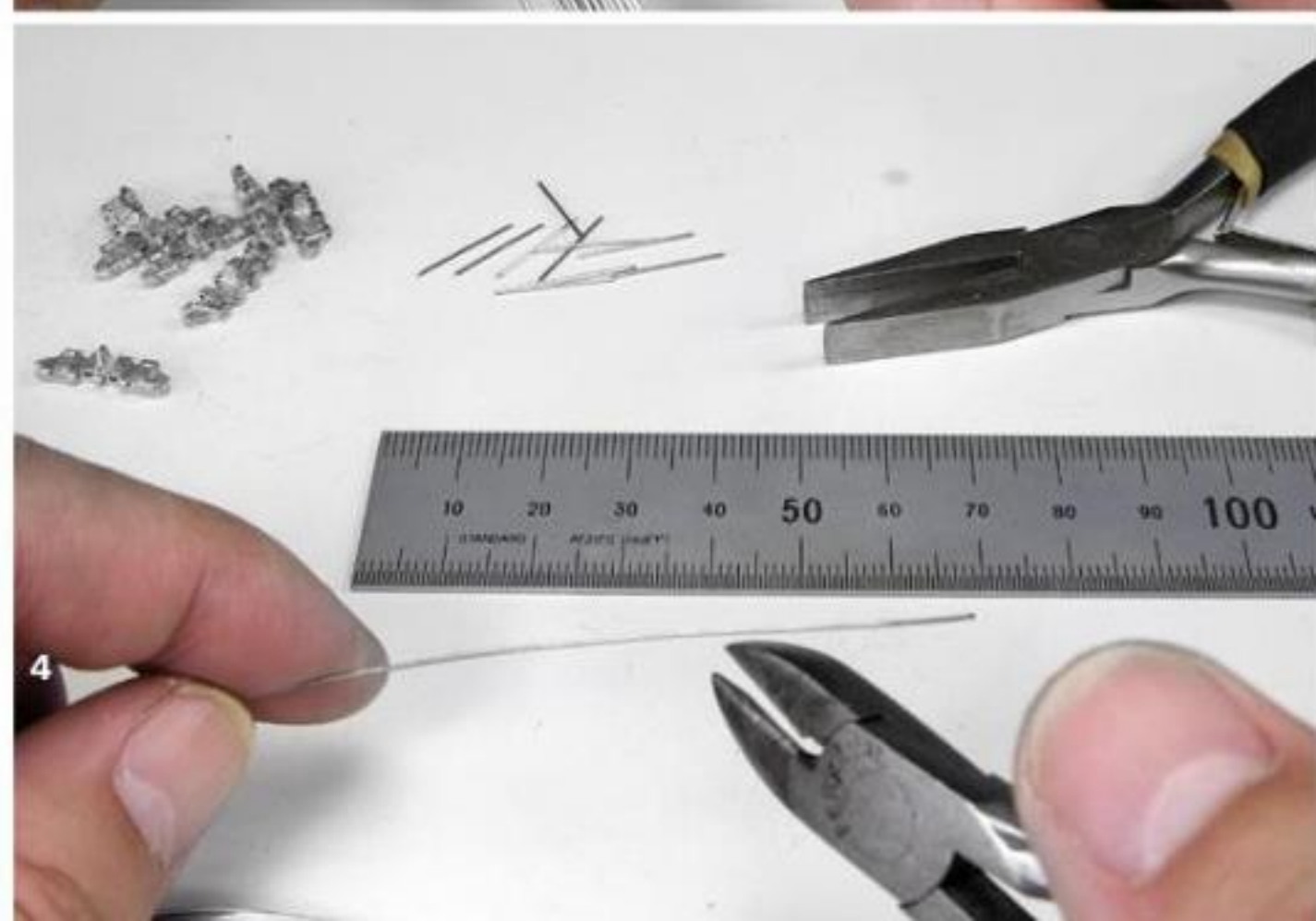
(4). Once we have taken the measurement of one of the pins we have to cut the necessary amount to complete both tracks.

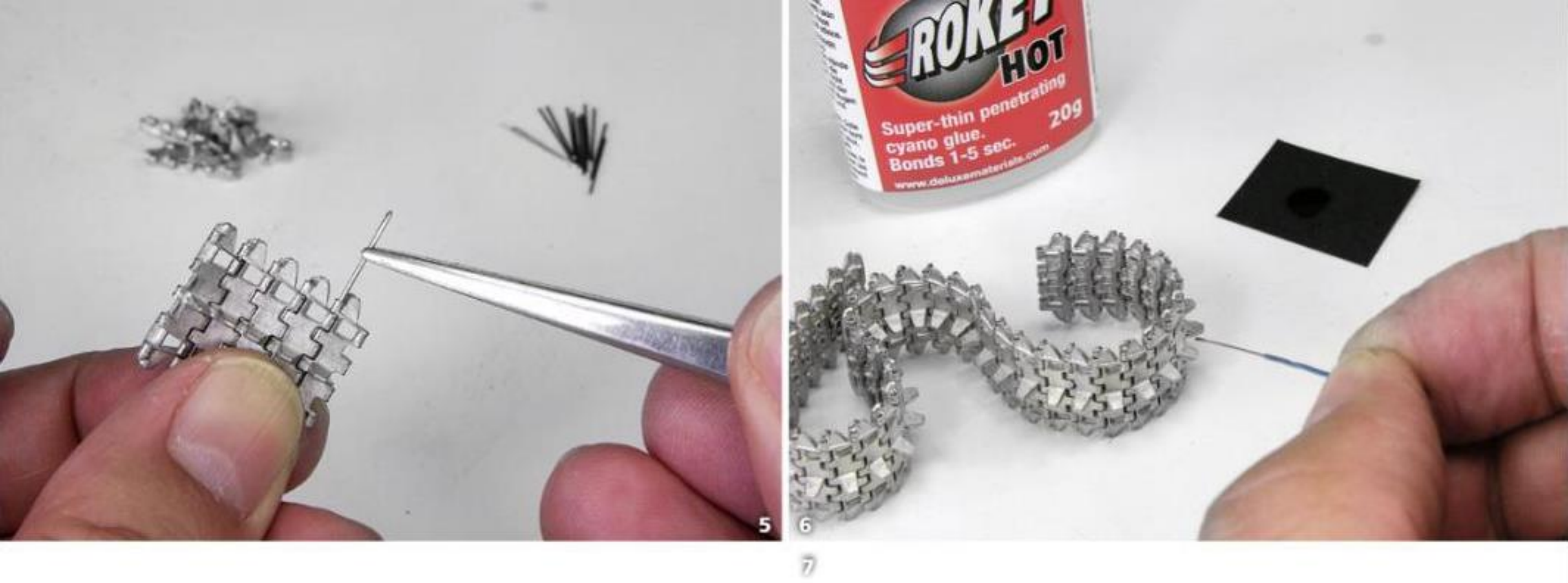
(5). Hold the links with your fingers and make sure the holes line up. Once faced, with the help of the tweezers we slide in each pin and we push it till the end so that the two track links are completely joined.

(6). Once we have finished connecting all track links we must fix the pins that join them with a drop of cyano so they do not come off during manipulation. We only have to fix the visible end of the pin. With the help of a piece of wire or needle we deposit a drop of cyano on each pin. We must pay special attention to this task since we risk glueing the links together and losing the mobility of the tracks.

(7). The tracks are ready to be painted and fully workable. We can easily add them to our model now.

(8,9). This is how the tracks look when correctly placed on the model. Notice the natural sag they present thanks to the weight of the metal. Compare with the picture above. The black tracks are the original, plastic tracks. Notice how they do not adjust very well to the running gear because they are not workable.





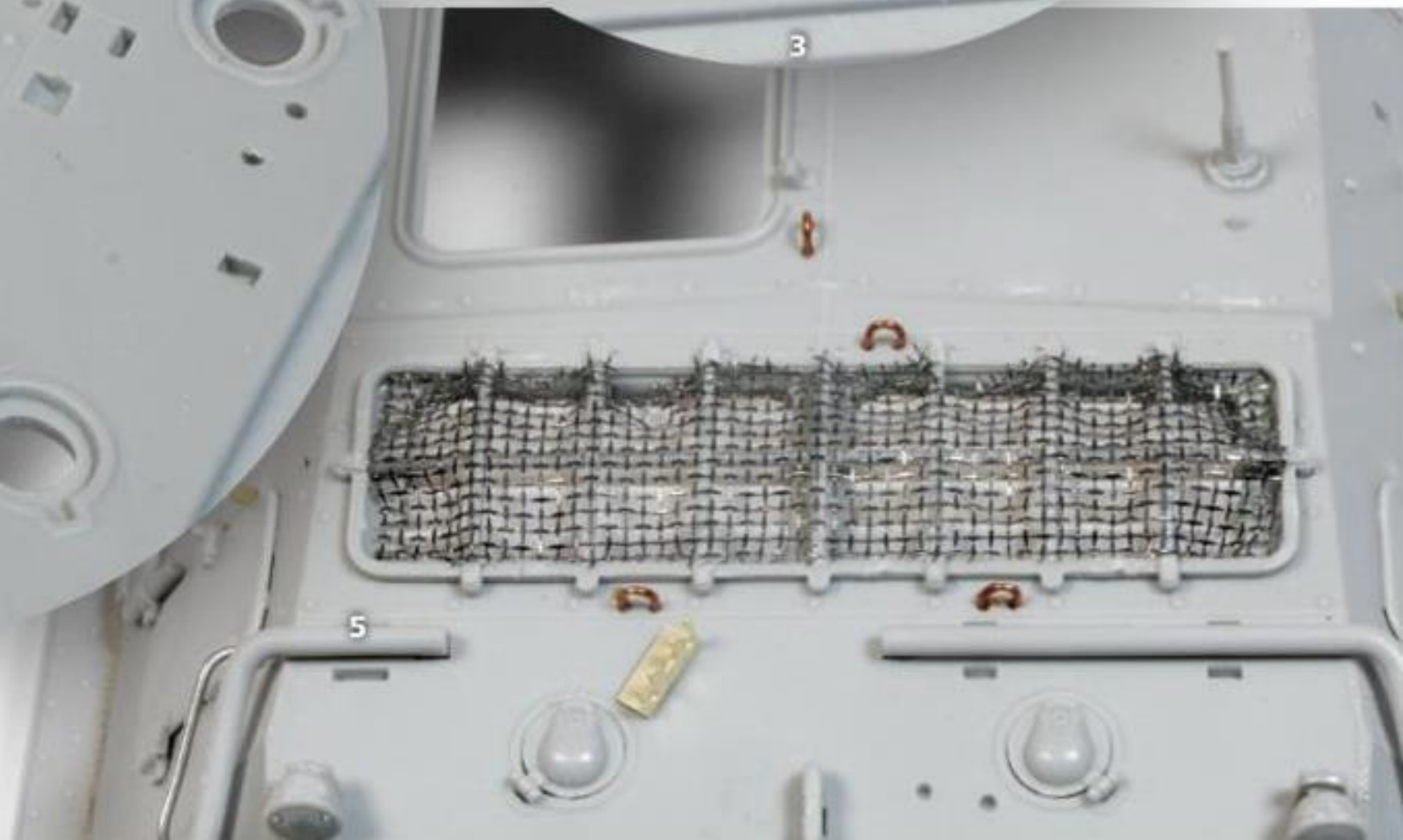
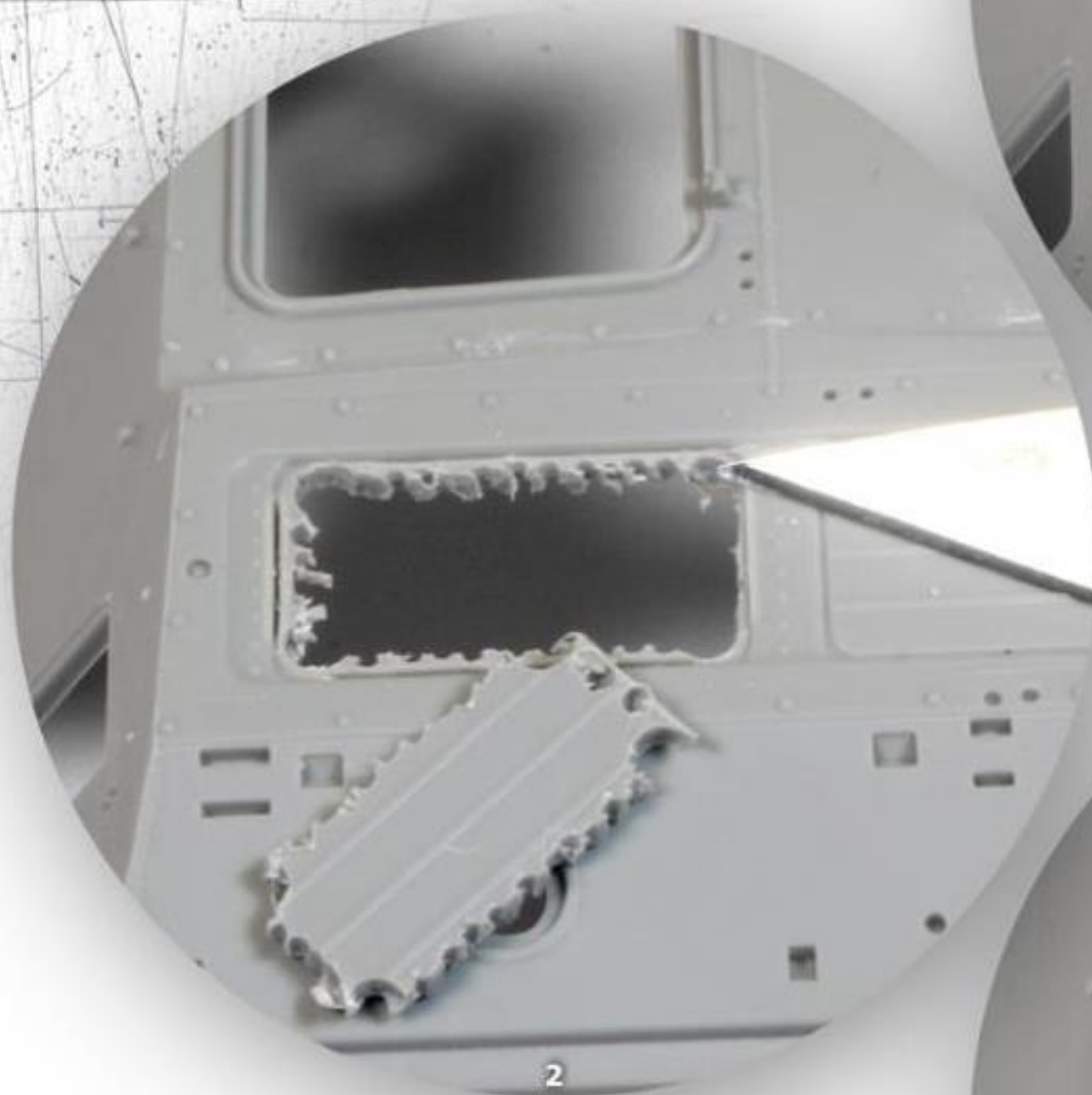
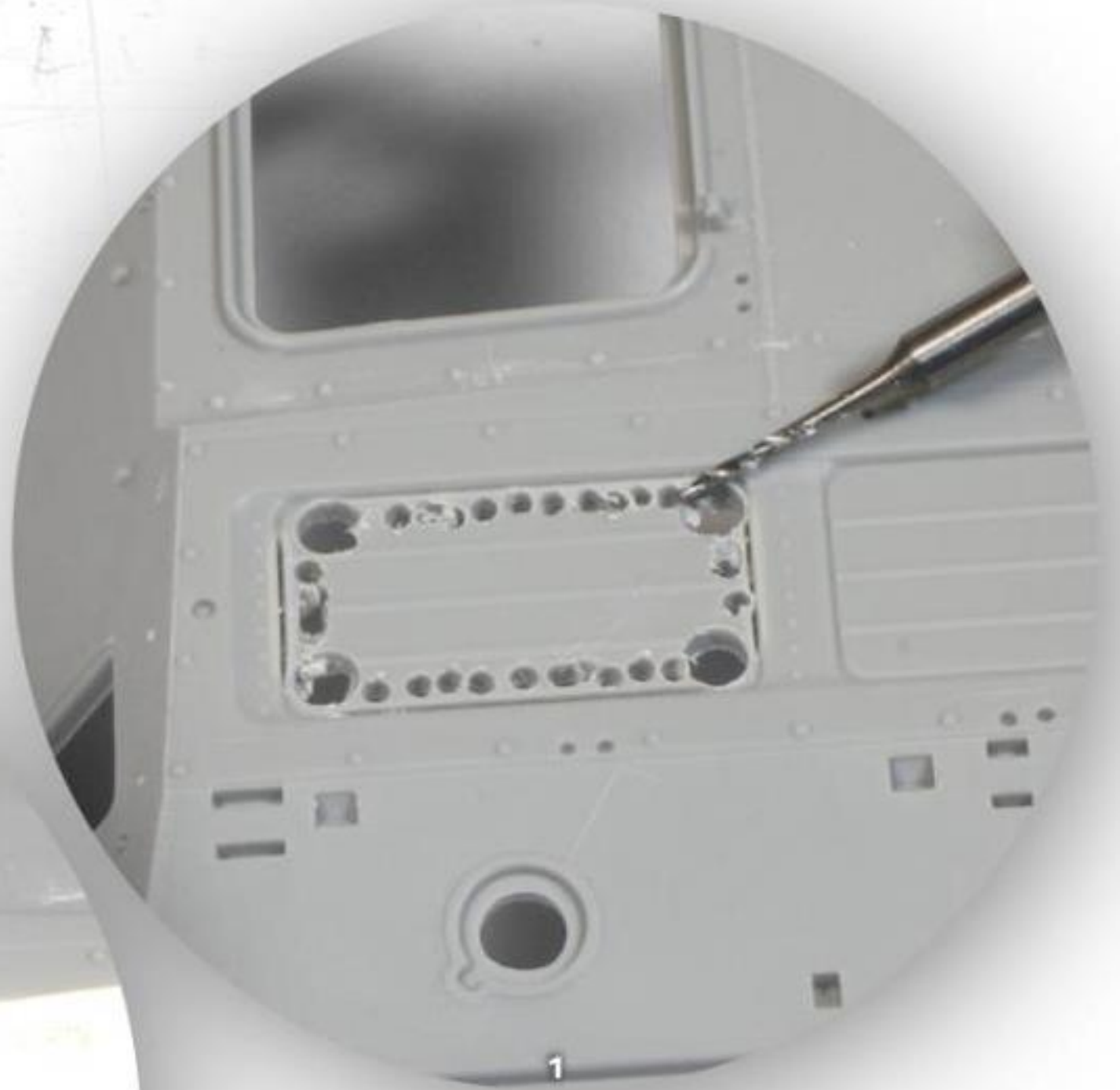
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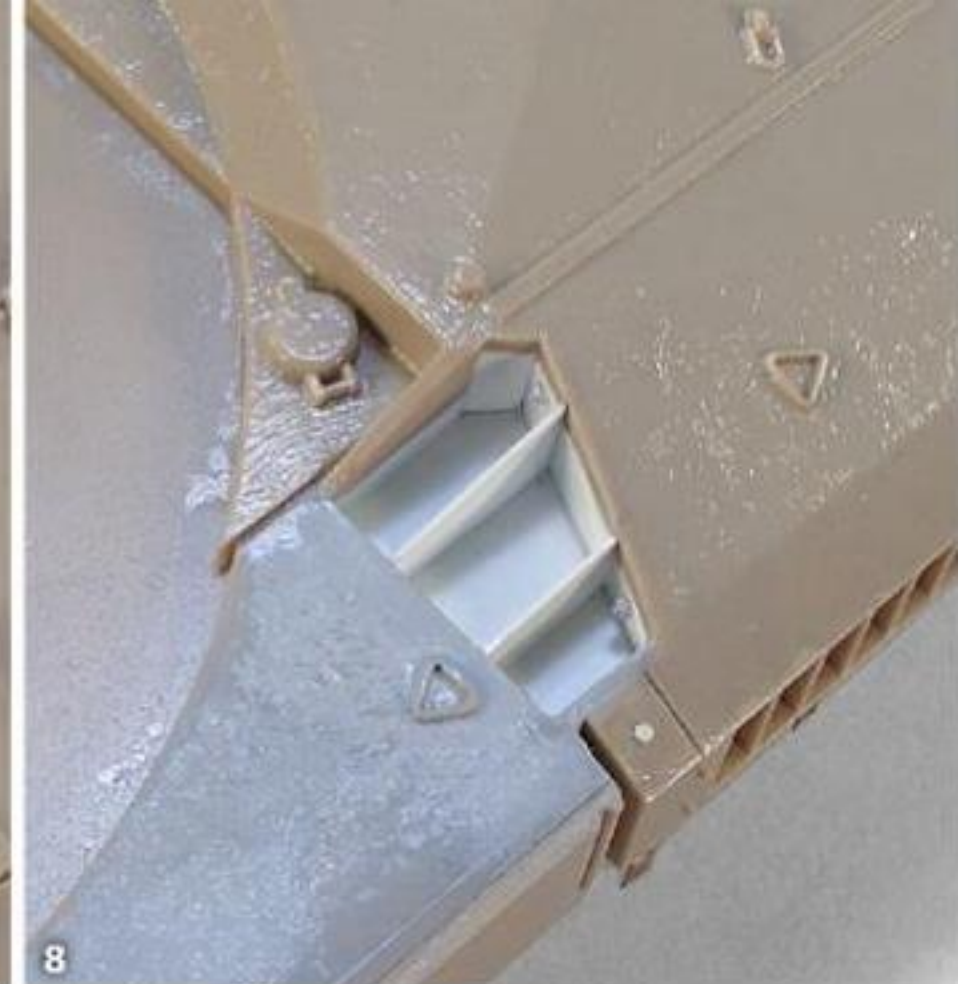
9



Grills

This improvement requires more experience and time, but it represents a great visual improvement. Most of the work consists in removing the existing grille and modifying the surface or immediately using a suitable purposely designed PE grill.





(1). To replace the rear grill of this model we will first have to modify the kit part. We can make a series of holes with the manual drill around the entire surface.

(2). With the help of a blade we remove all excess plastic.

(3). Next we use metal files to tidy up the cut.

(4). We add the slats inside with plasticard.

(5). With a piece of wire mesh we make the grill. This also allows us to shape the grill according to the 'abuse' our vehicle has gone through.

(6, 7, 8). Sometimes besides removing the original grill we must correct the hole that will house the grills. In the following examples both the box and the inner slats have been made with plasticard.

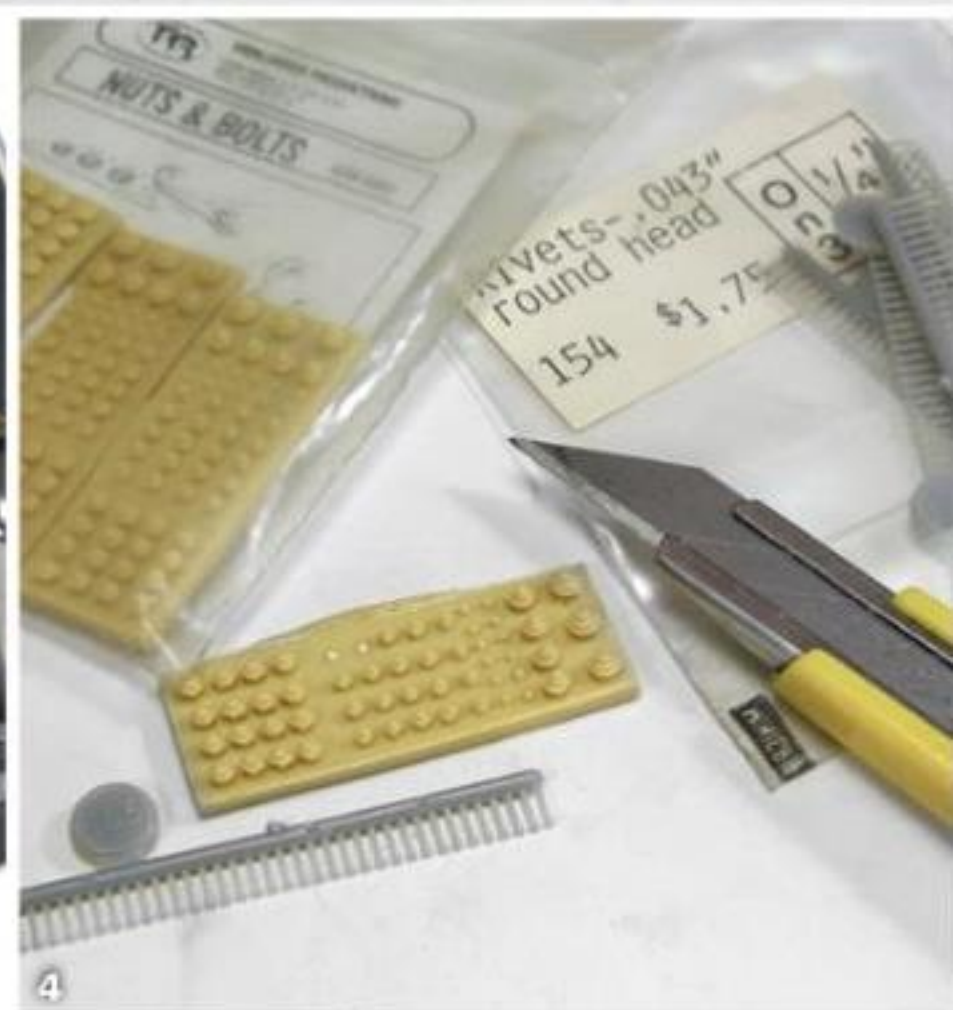
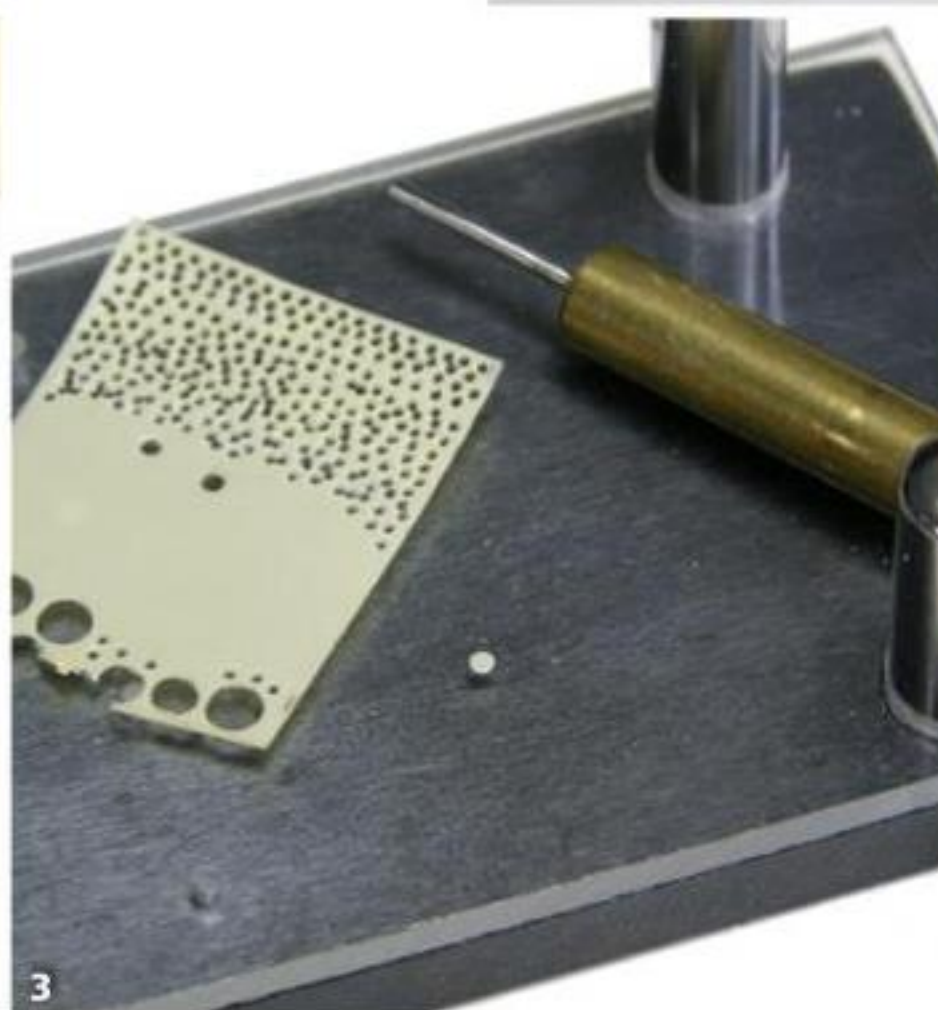
(9, 10). The last step will be the placement of the grills, in this case comercial photoetched ones, . Once painted and weathered their look improves considerably.



Rivets

These small elements are usually nicely represented in recent model kits, but they are often missing in older ones. Even when they are included, it doesn't always mean they are placed correctly or have the correct size and shape.

There are no home-made solutions for easily and effectively creating rivets so we have to turn to a commercial set.



(1). There is a tool on the market to reproduce rivets of various sizes and shapes. It's not cheap but it's very effective. It's called a "Punch and Die" or punch.

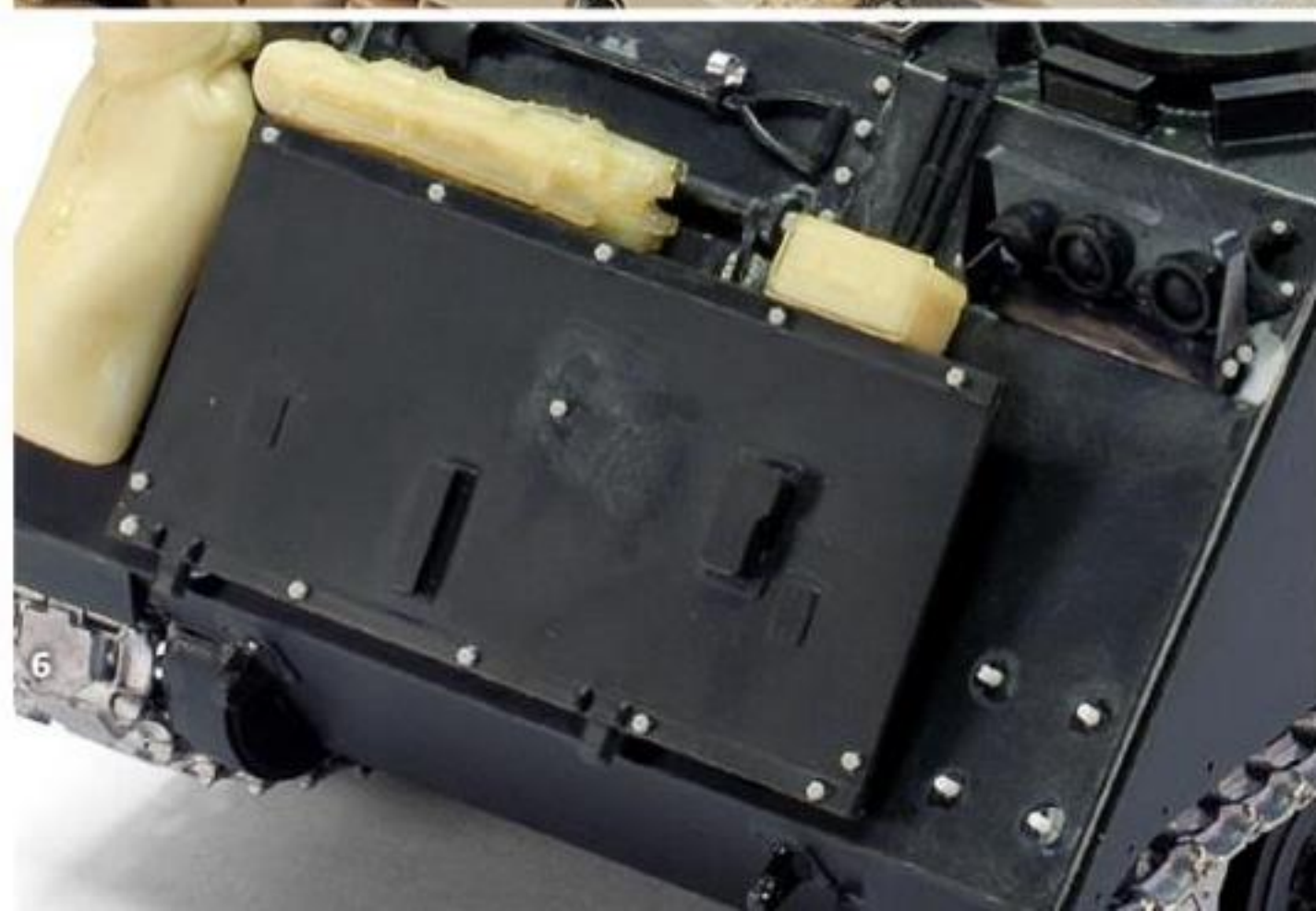
(2). Once you have chosen the right thickness of plastic sheet and the correct size and shape of the rivet all you need to do is place the punch on the corresponding hole and punch out the rivet with the small tool.

(3). This tool allows us to create all the necessary rivets, one by one. The method is not particularly fast but it does the job.

(4). An alternative solution is to buy rivets. There are resin, plastic and even photoetch rivets, with multitude of shapes and sizes. Their manipulation is somewhat more delicate as they require the use of cyano.

(5). For the detailing of the barrel of this vehicle we have used a multitude of plastic rivets.

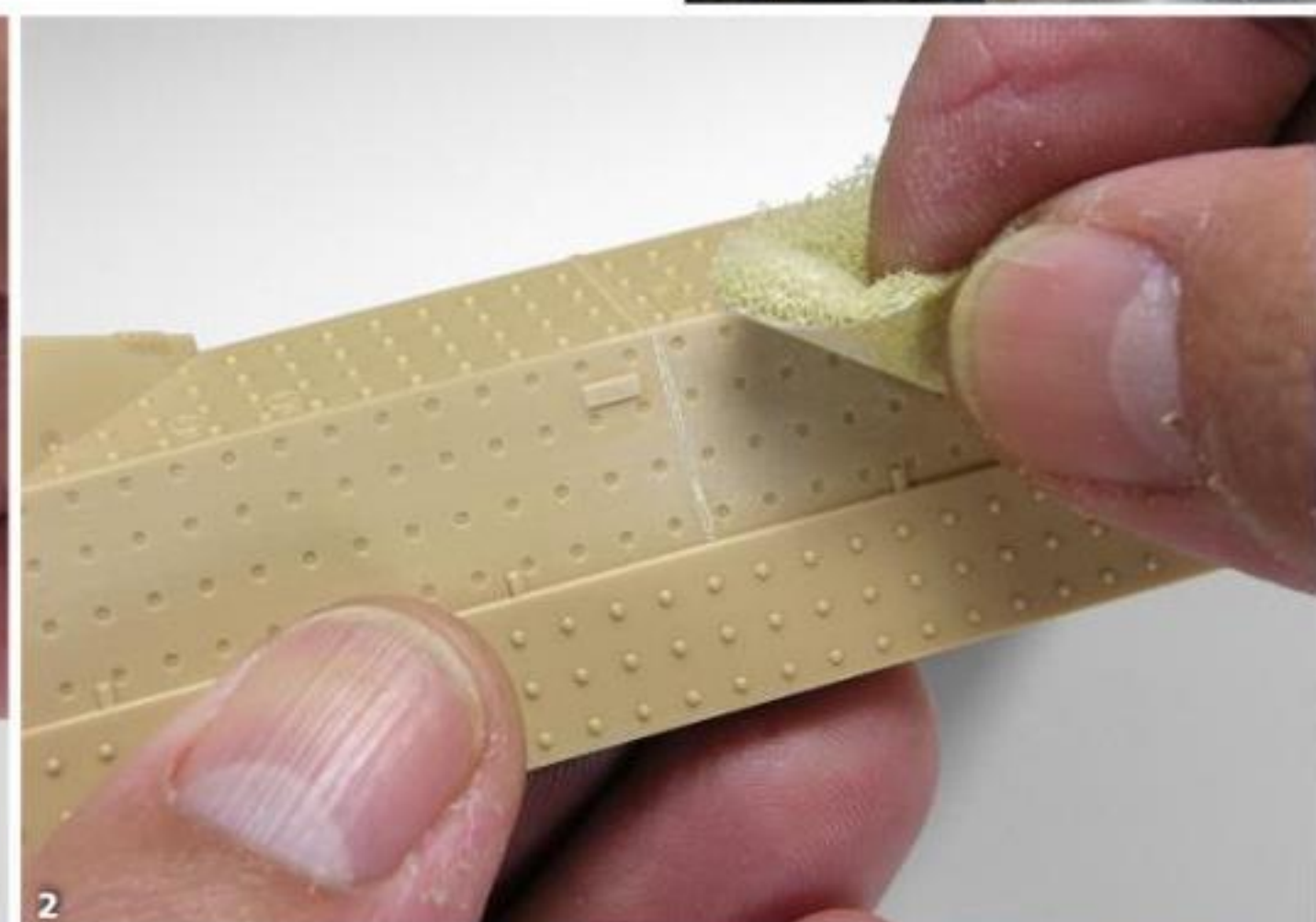
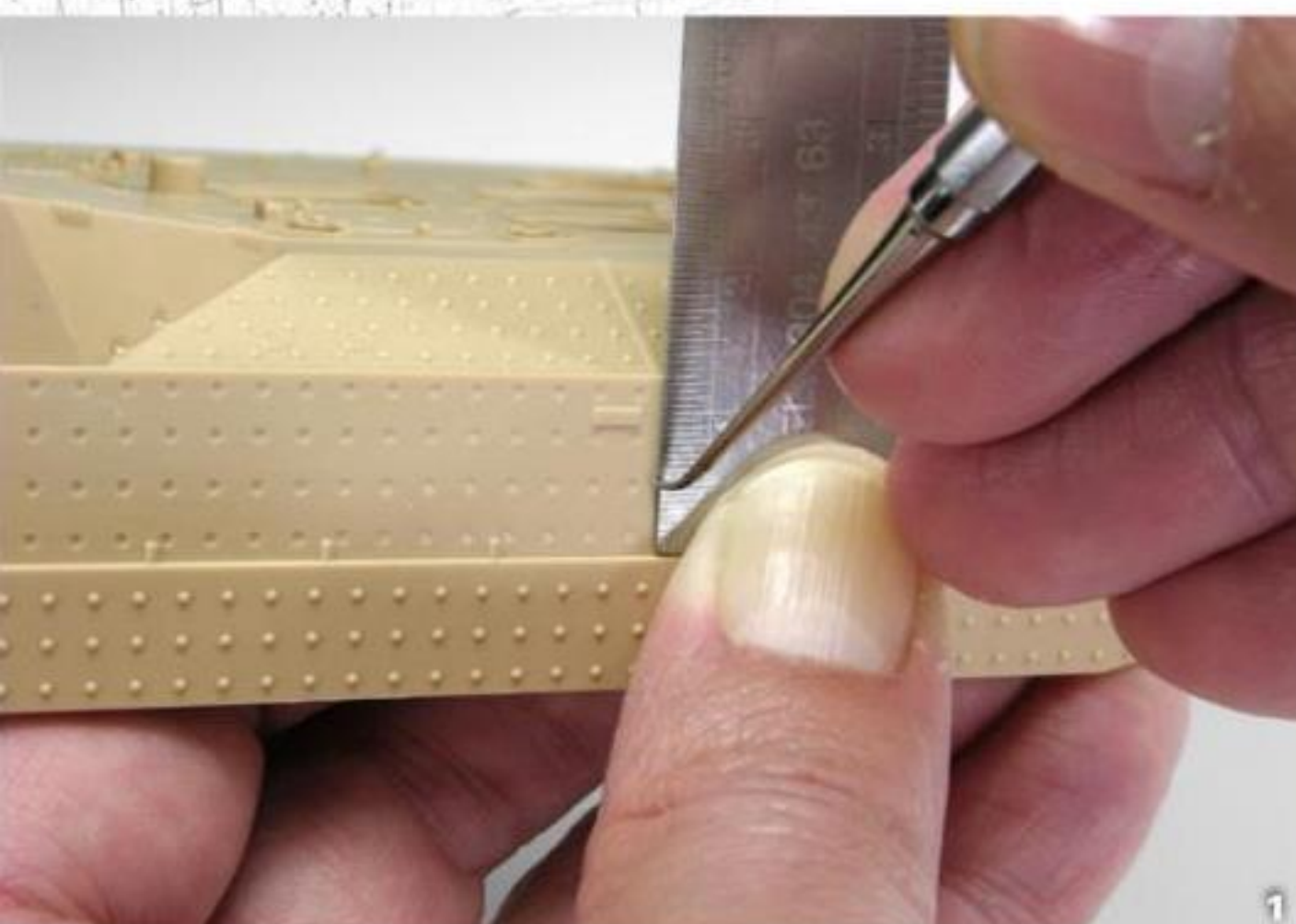
(6). On the front of this vehicle have used rivets with an hexagonal shape.



Weld lines

This aspect, sometimes omitted or incorrectly reproduced, requires some attention on our part. Despite the fact that the current manufacturers and brands are increasingly improving their kits, it is good to have some decent visual references to make sure that the main welds are present and have the proper shape.

Adding welds is rather easy and can be carried out in multiple ways including the use of the stretched sprue or putty. We can even find resin decal weld lines.



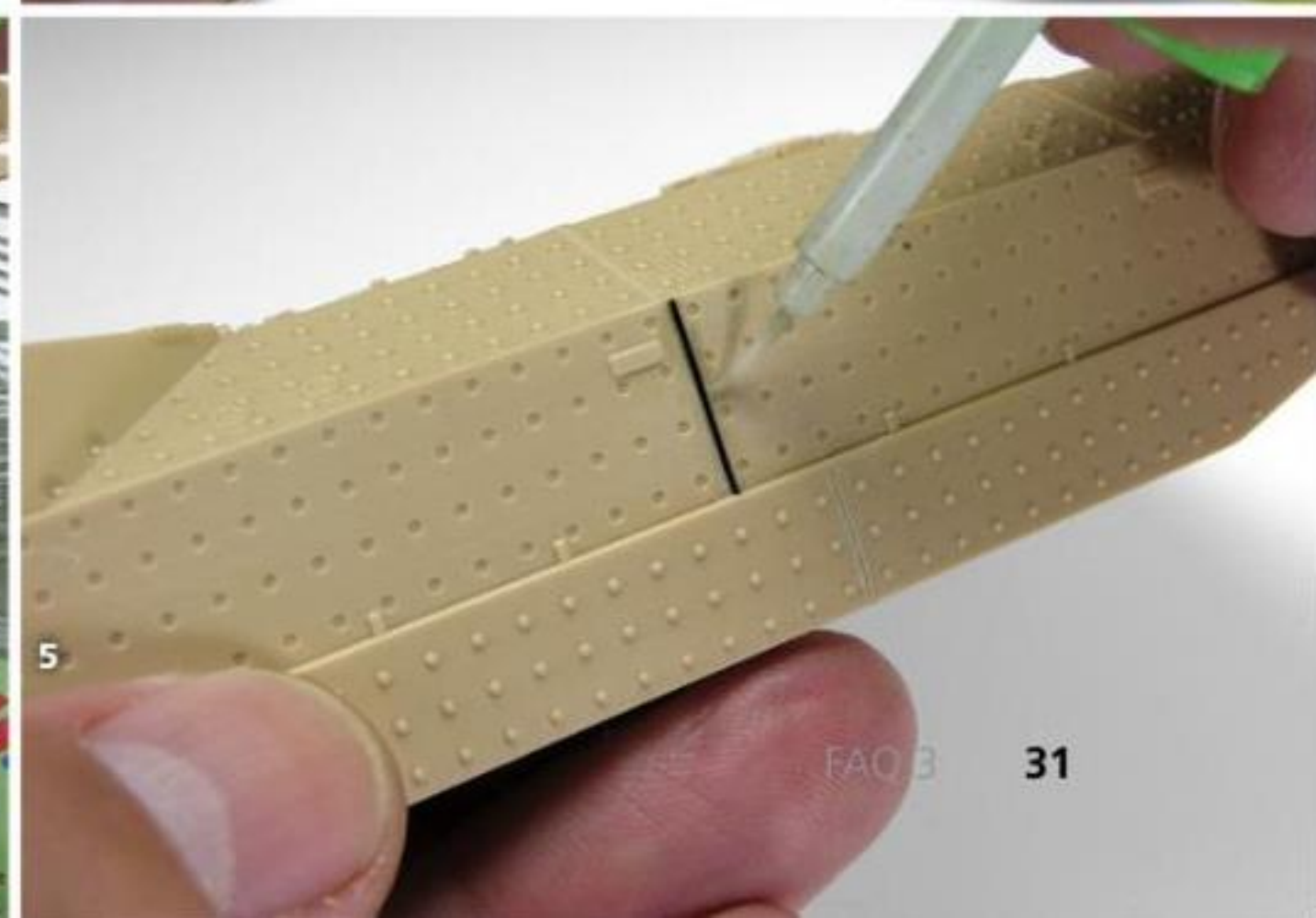
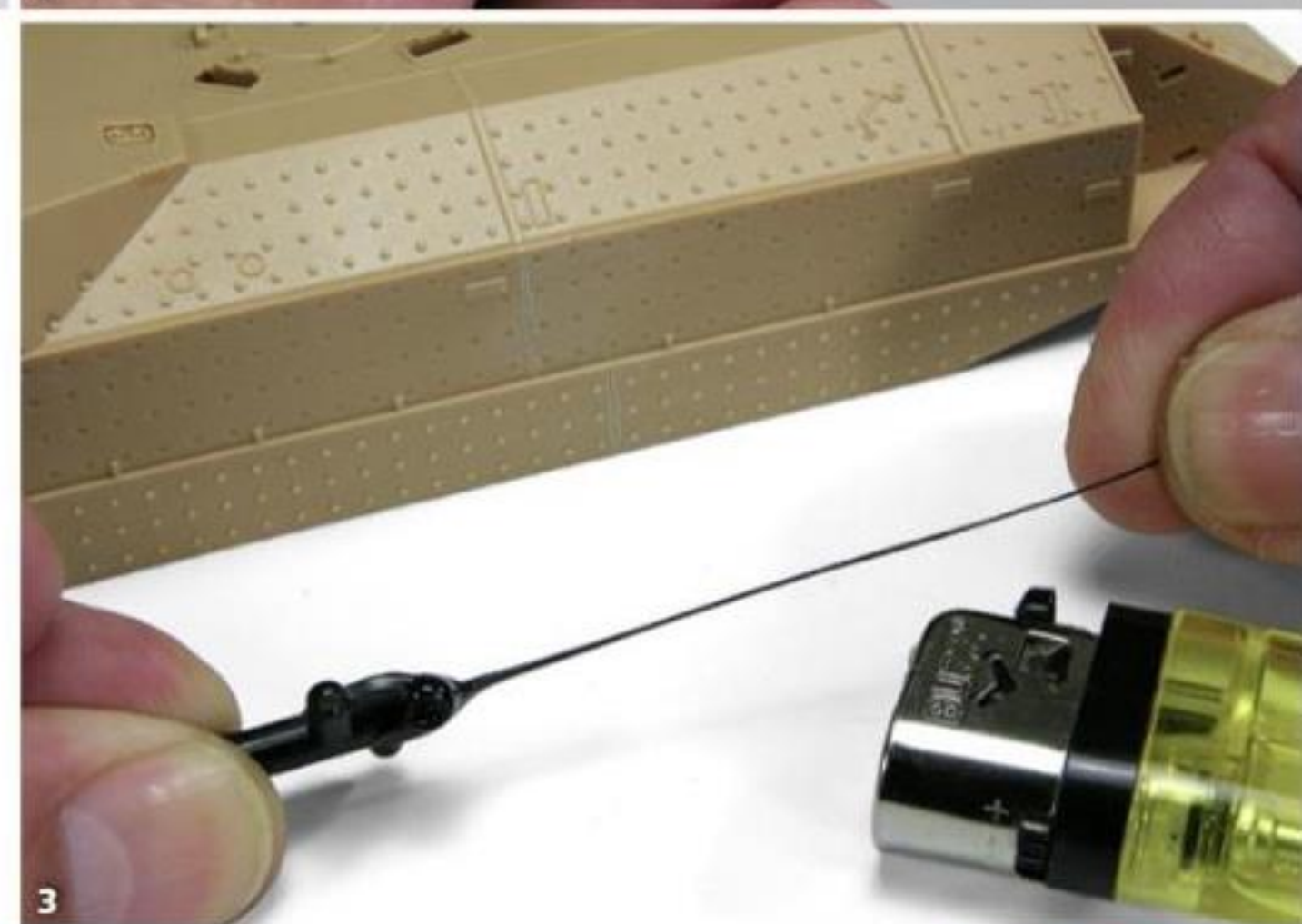
(1). To add a weld line with stretched sprue it is best to create a tiny slit to keep the stretched sprue in place. For this you can use a scribe or scraper.

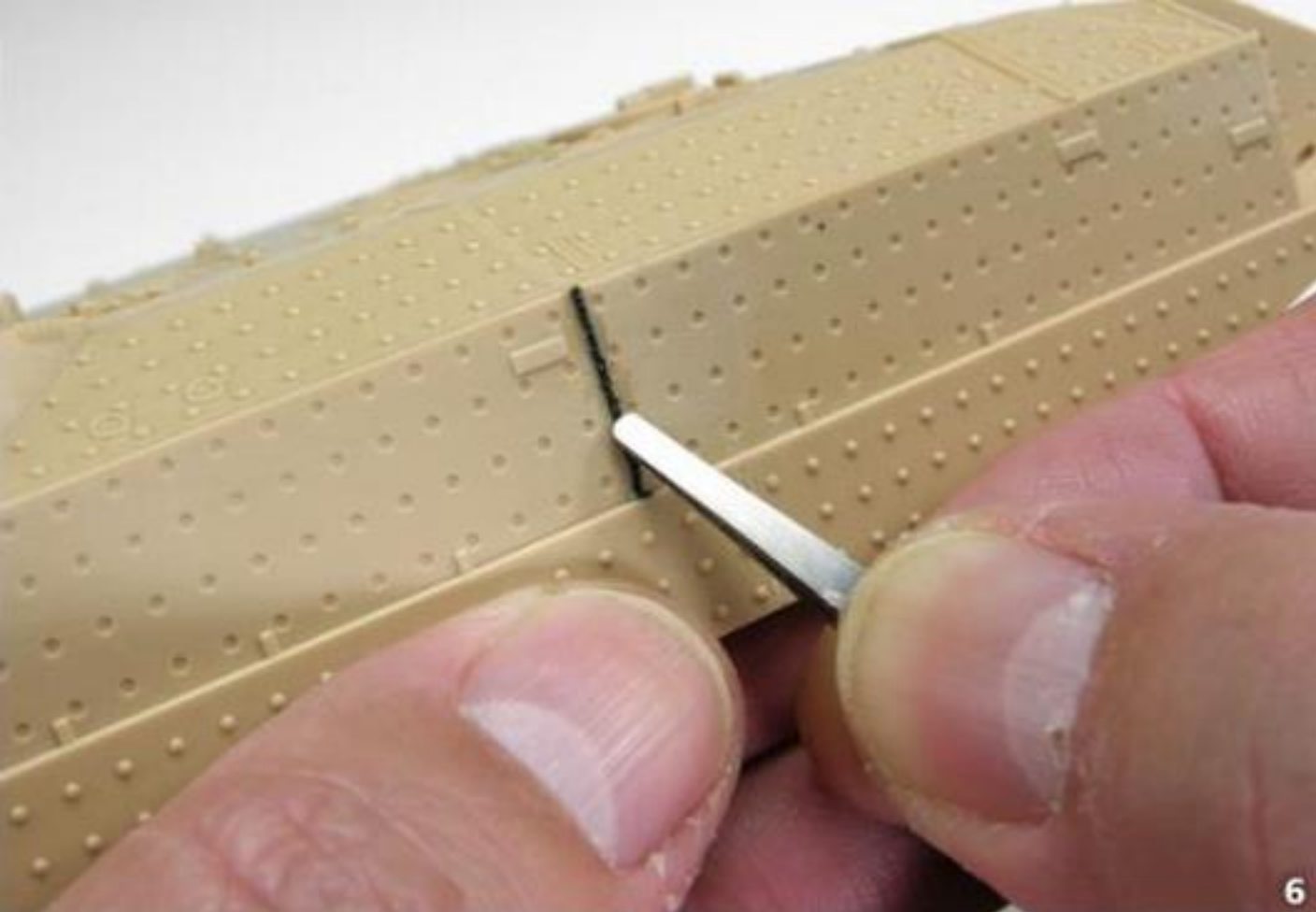
(2). With some soft sandpaper we clean up the edges of the slit and smoothen the surface.

(3). We cut a piece of sprue from a model kit and heat it (evenly). Then we stretch the plastic until it has the proper thickness for our weld line.

(4). We gently drop it in the slit and fix it with liquid adhesive.

(5). The glue melts the plastic so we must add glue until the plastic softens.





(6). With a flat metal tool we press the plastic until we see it is changing shape. We continue until we obtain the desired shape.

(7). Once this process is finished, it mimics perfectly many of these welding lines.

(8). We can also use the back of a drill bit to reproduce thinner weld lines.

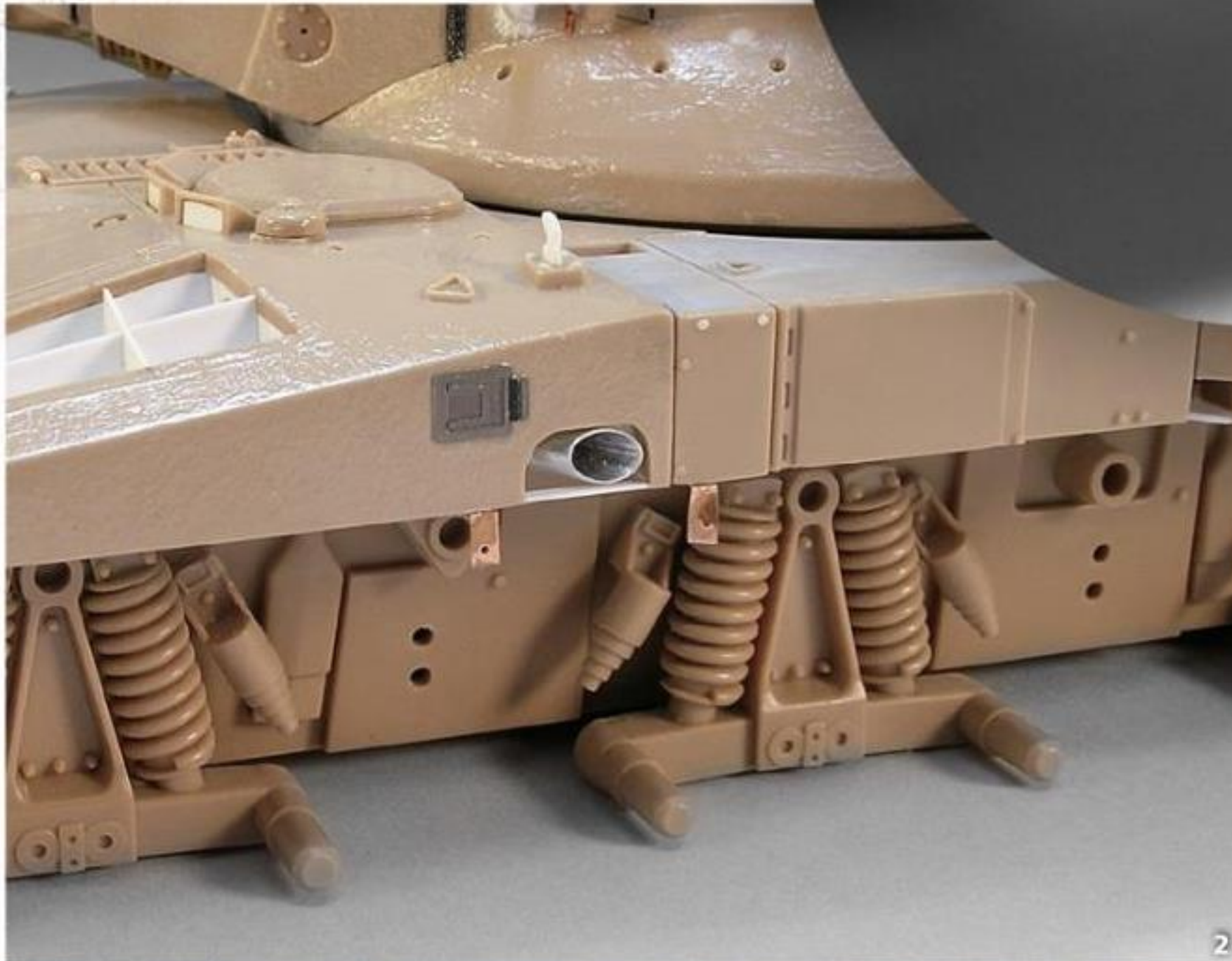
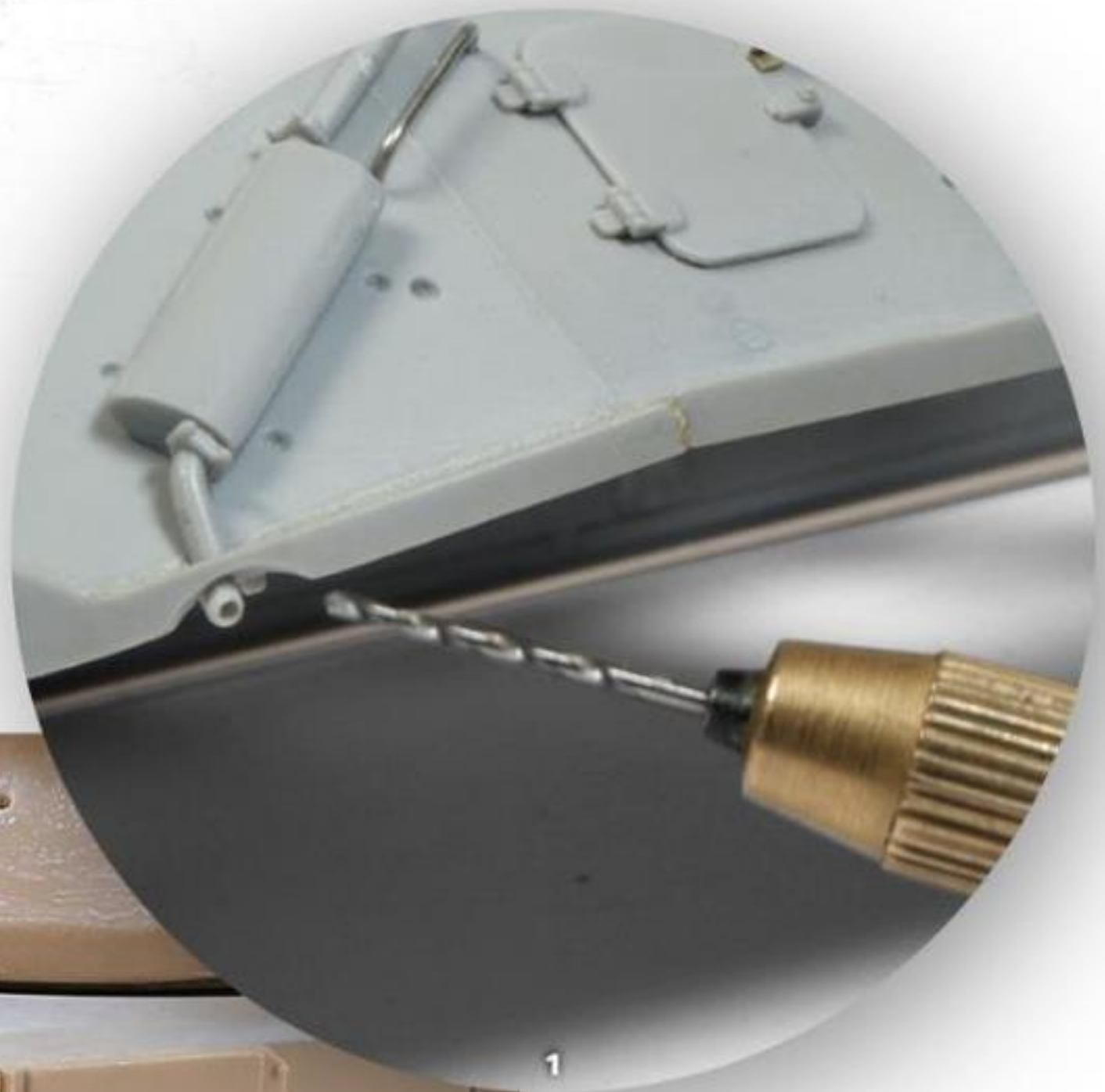
(9). We can compare the welds added to this vehicle turret, with stretched sprue on the left, in black, and another big weld made with a rectangular section of plastic rod on the right, in white.

(10, 11). To create weld lines with two-component putty we create a thin string of putty. We press this against the area where we want to create the weld. After a couple of minutes we can start shaping the putty with a blade or any other convenient object.



Exhaust pipes

As far as exhaust pipes go we have a number of options to improve them. Either we hollow them out - if that isn't the case yet, or we replace them. In any case there is little room for improvement.



(1). If the exhaust is solid we can make a hole with the hand drill and the right drill bit. It's important to center your drill as much as possible. We can mark a point in the center with a needle or pin. In case it is already hollowed, the edge may still be too thick so it will have to be thinned. This can be done with a drill with a larger diameter than the original hole.



(2). In some cases if the exhaust diameter is large enough we can replace it with a metal one. The bevelled shape of the exhaust on the left side of this vehicle is very peculiar so we cut the tube and we file the edge appropriately with a metal file.

(3). On the right side the exhaust is flat. We use the same tube. This time the improvement is much easier to carry out. The final effect after the replacement is much more convincing and even allows the introduction of dents and scratches.



The very recognisable Merkava Mk.I based on the old Tamiya reference includes many improvements, both home-made and commercial. It is a clear example of how you can transform a 25 years old model kit into a more than worthy, updated model.



This full resin Unimog 404 has only been updated with small improvements such as replacing the handles and hooks, wiring and a metal box.



Another clear example of "restyling" is this old M113 ACAV from Tamiya, which incorporates all kind of improvements, mostly commercial.



This BTR 60 includes different improvements, both home-made and commercial. Features that stand out are the replaced handles, the rear grill, the hollowed-out barrel and exhaust, the wiring of the headlights and some PE parts.



II.1.2.

RESIN IMPROVEMENTS

When detailing a model there are many options as we can use both commercial or home-made improvements.

Prominently featured are the resin improvement sets that many manufacturers offer for detailing a specific model.

We can find almost everything on the (after)market. From a specific part of the model, such as the cargo compartment, the engine or the wheels, to complete improvement or conversion kits.

Next we will see how to work and prepare resin pieces. Furthermore we will cover some improvements, that we could consider intermediate level that help change the overall look of any model.



(1). After identifying all the parts of the set, we must remove the resin casting blocks. Use a sharp blade. Be careful and patient.

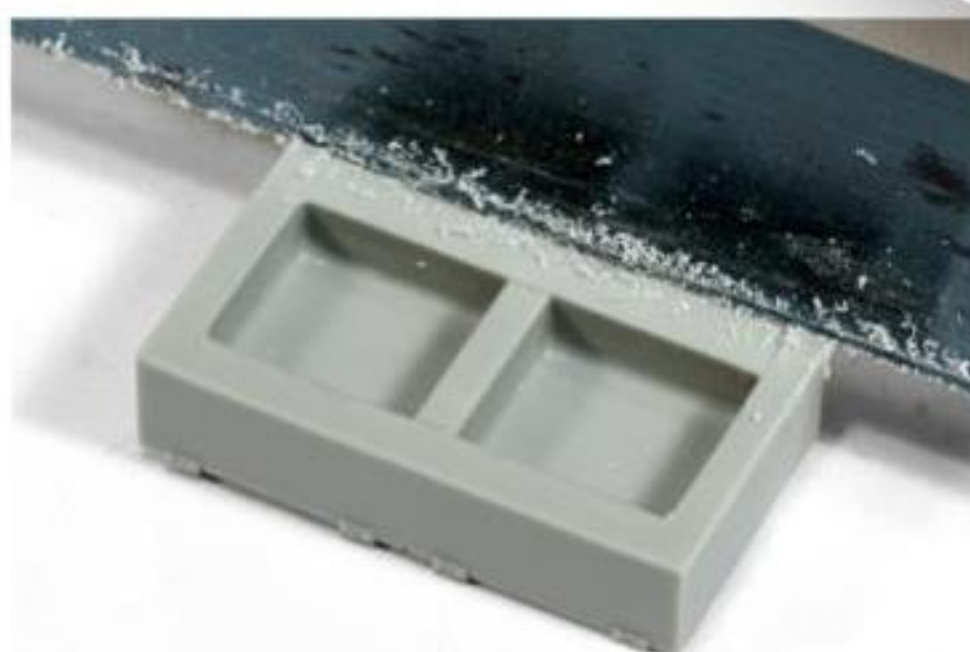
(2). When the size of the blocks and the part allows it, we can use a small saw to guarantee a straight and clean cut.

(3). Touch up with the blade where necessary.

(4). And finally, essential, a good piece of sandpaper to smoothen the cut. Make circular movements in different ways to avoid steps and crooked surfaces.

(5). After this process the part is ready and can be glued in place.

(6). This requires superglue (cyanoacrylate). It's very fast though we must have certain precautions when working with it.



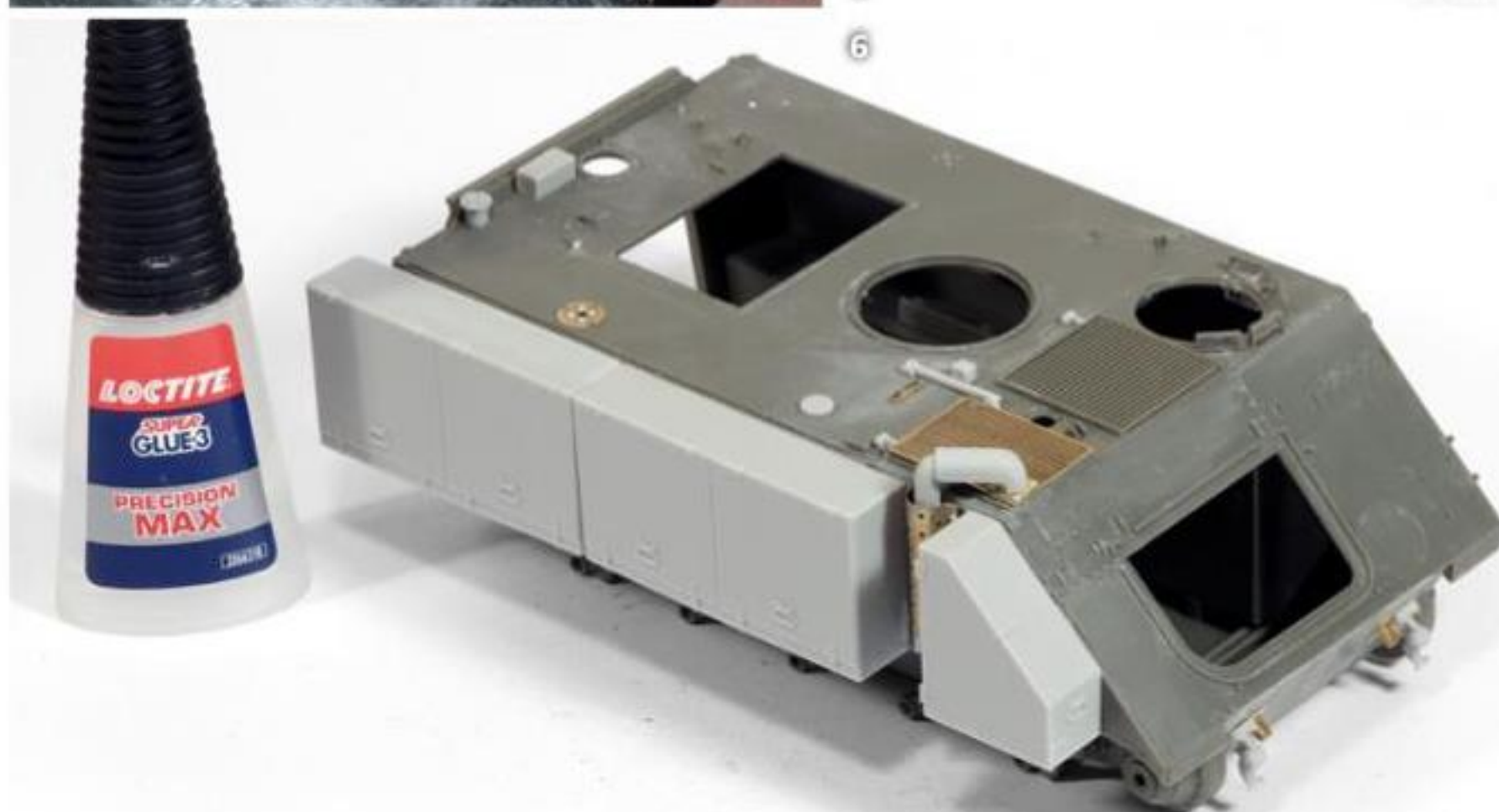
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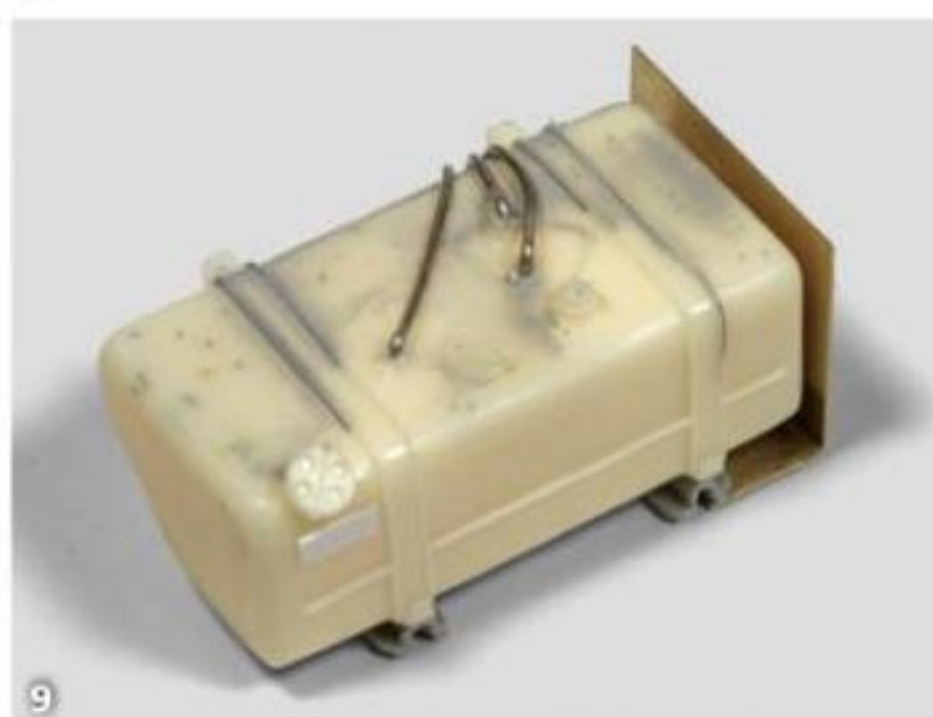
(7). A typical improvement in recent manufactured kits is the replacement of the wheels by resin ones. The main reason is that the rubber material they are made of has less detail and sometimes ends up cracking due its flexibility.

Resin wheels usually are high-quality and provide lots of detail. If that is not enough we can also find resin replacements that simulate weight and sag. Resin wheels also guarantee that the painting and weathering will remain pristine.

Storage boxes, fuel tanks/canisters and a whole series of other accessories are the usual suspects to be replaced by their resin counterparts.



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(8). Observe the difference between the original wheel on the right and the resin version on the left. Although both have great detail, the resin wheel will be safer and more durable when painting and weathering.



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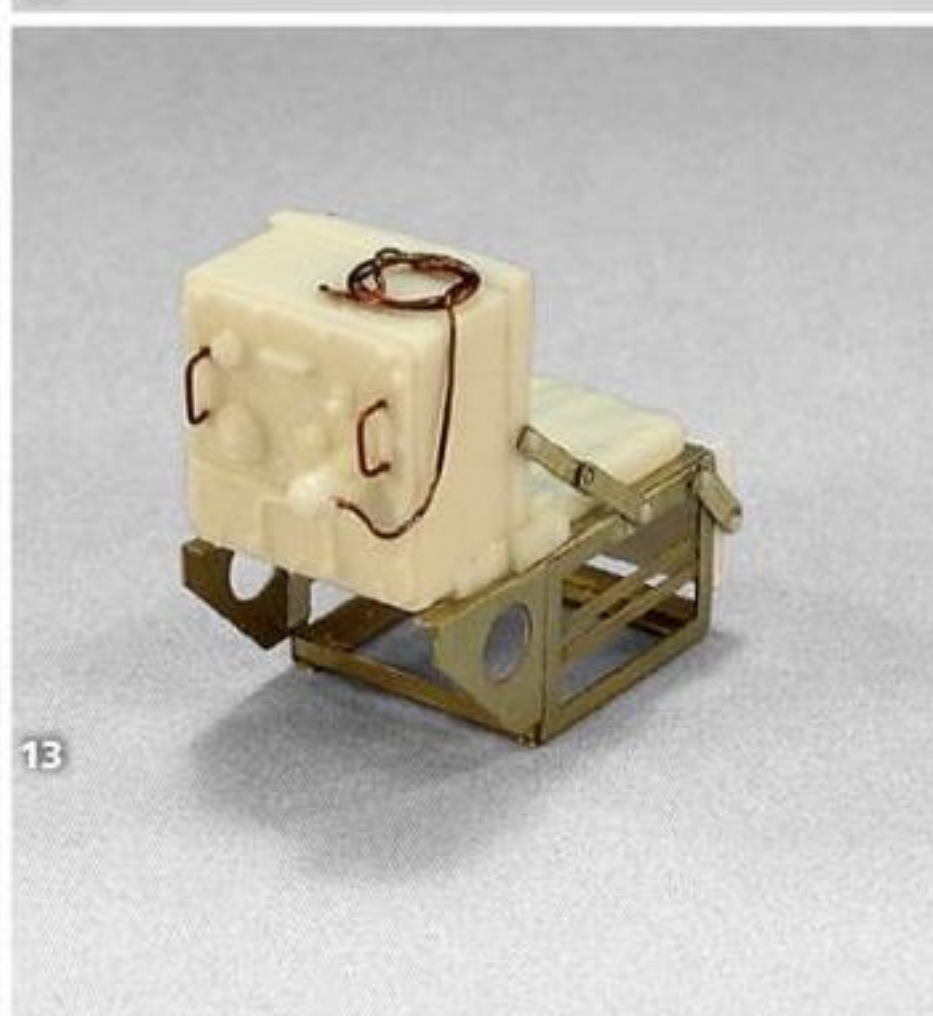
11

(9). Usually the resin parts present an extra level of detail in compared to the kit parts. Another advantage is the absence of mold lines.

(10). Sometimes the replacement of a original part by a resin one is mandatory for functional reasons. The difference between these two filters is more than obvious. The resin version represents an unit used in arid or desert conditions.



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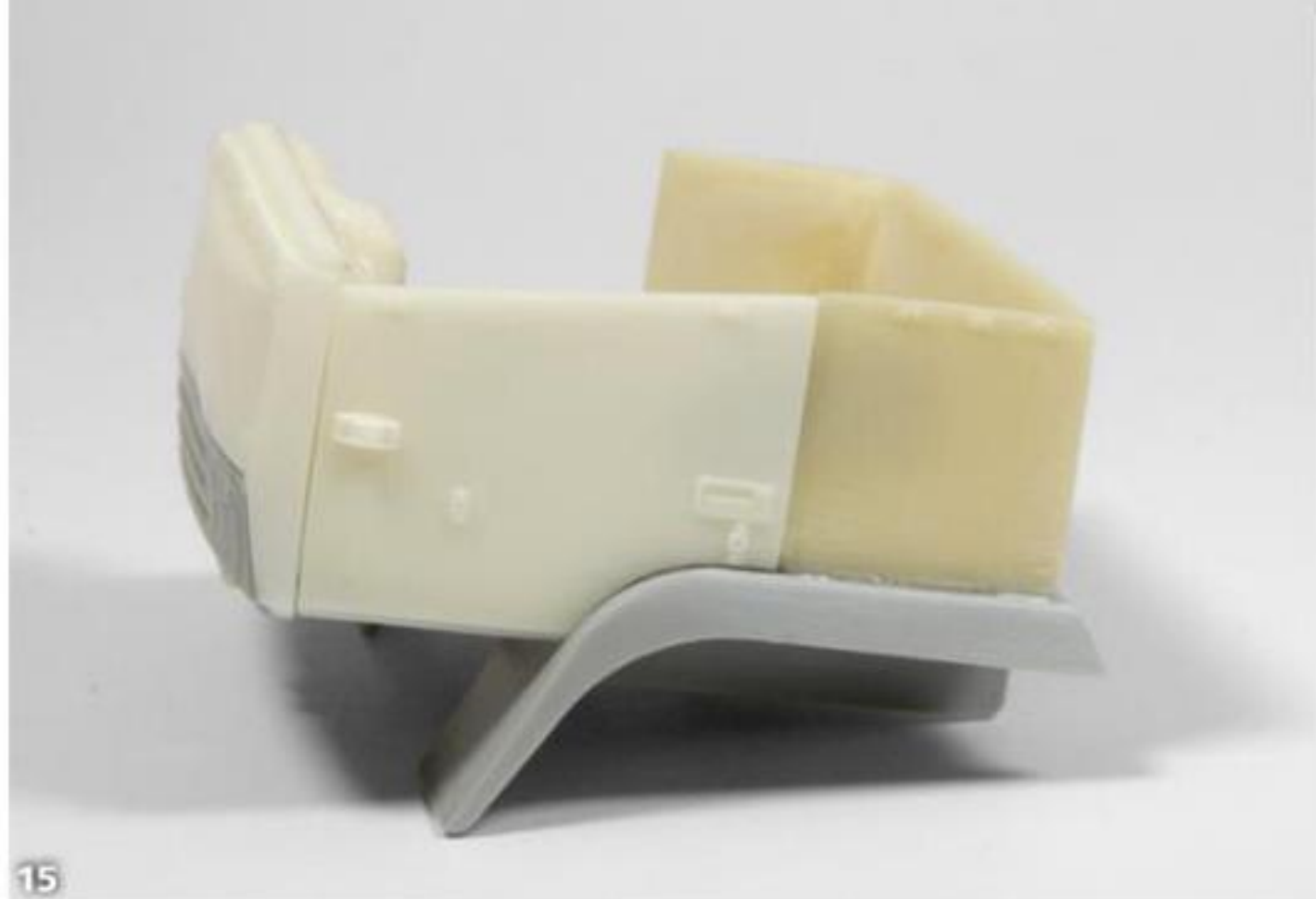
13

(11). The replacement of the plastic seats by some resin copies increases the level of detail and seat texture. The latter tends to incorporate wrinkles that will improve the look once painted and weathered.

(12, 13). The full detail of these seats from a Ford Mutt not only includes the resin and the PE but also some plasticard and copper wire pieces.



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(14). Although sometimes we need to use resin pieces, these improvements are not always an advantage as the fitting and shape can be inaccurate.

(15). The open-topped version of the cab of this truck is an attractive transformation that can only be found in resin.

(16). Quite often we will combine parts of the original model with resin parts of the improvement set. When different manufacturers are involved extra efforts in terms of fitting may be required.



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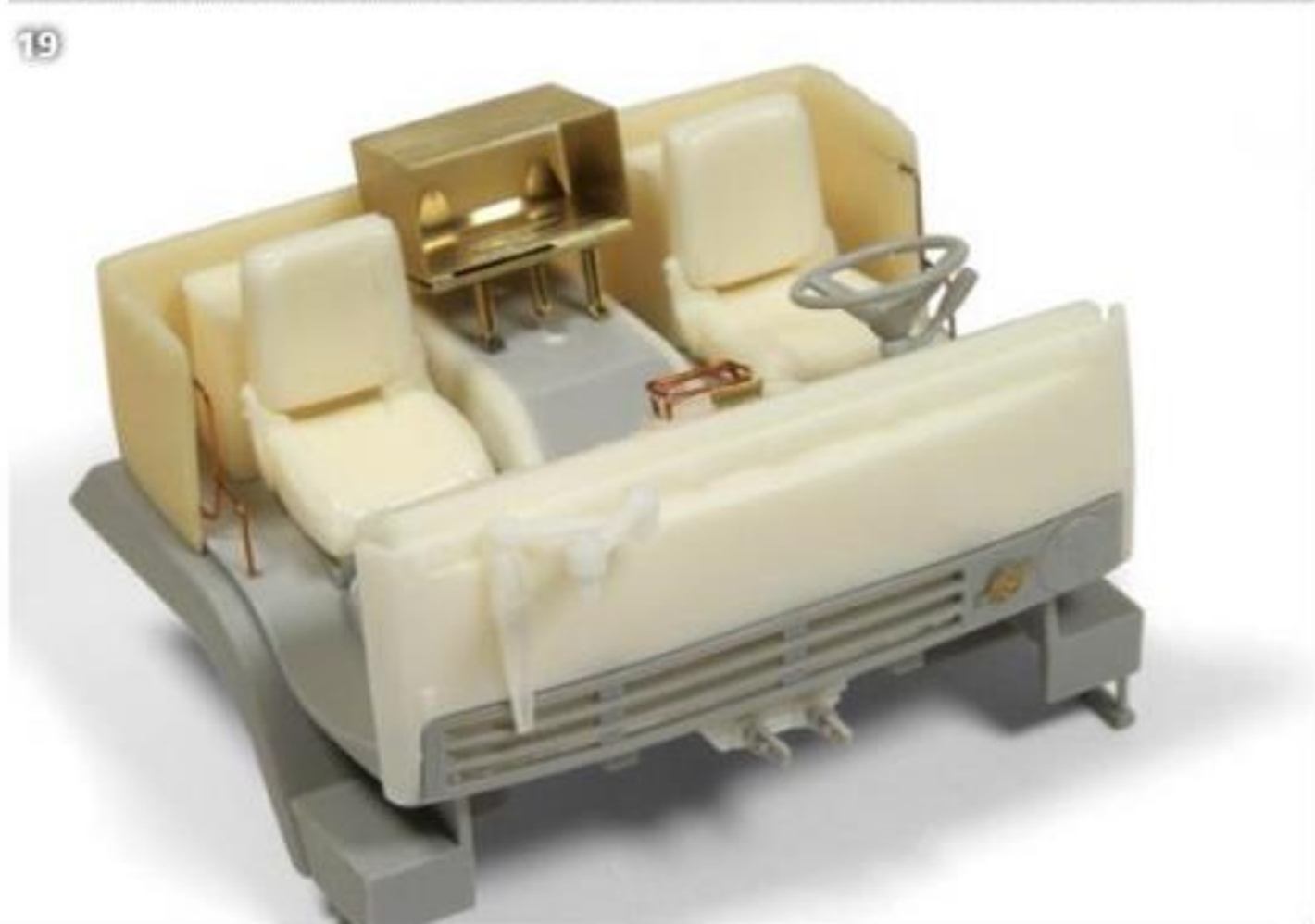


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(17, 18). We will also have to add homemade pieces or even photoetch ones.



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(19). Once the work is completed, even though the quality and detail of the resin can be very variable, the result is quite attractive, although it's a shame that some specific sets and versions are only available in resin.



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(20). Another typical improvement is the 'cargo' or accessories that we can place on the vehicle. We can find sets that perfectly fit a specific vehicle.

(21). Or, following a different approach a multitude of individual accessories that we can combine and place according to our needs.

(22). Finally, for the more adventurous modelers, we can find a whole series of improvement sets that include parts in various materials, resin, PE, ... to super-detail a model and build an eye-catching version.

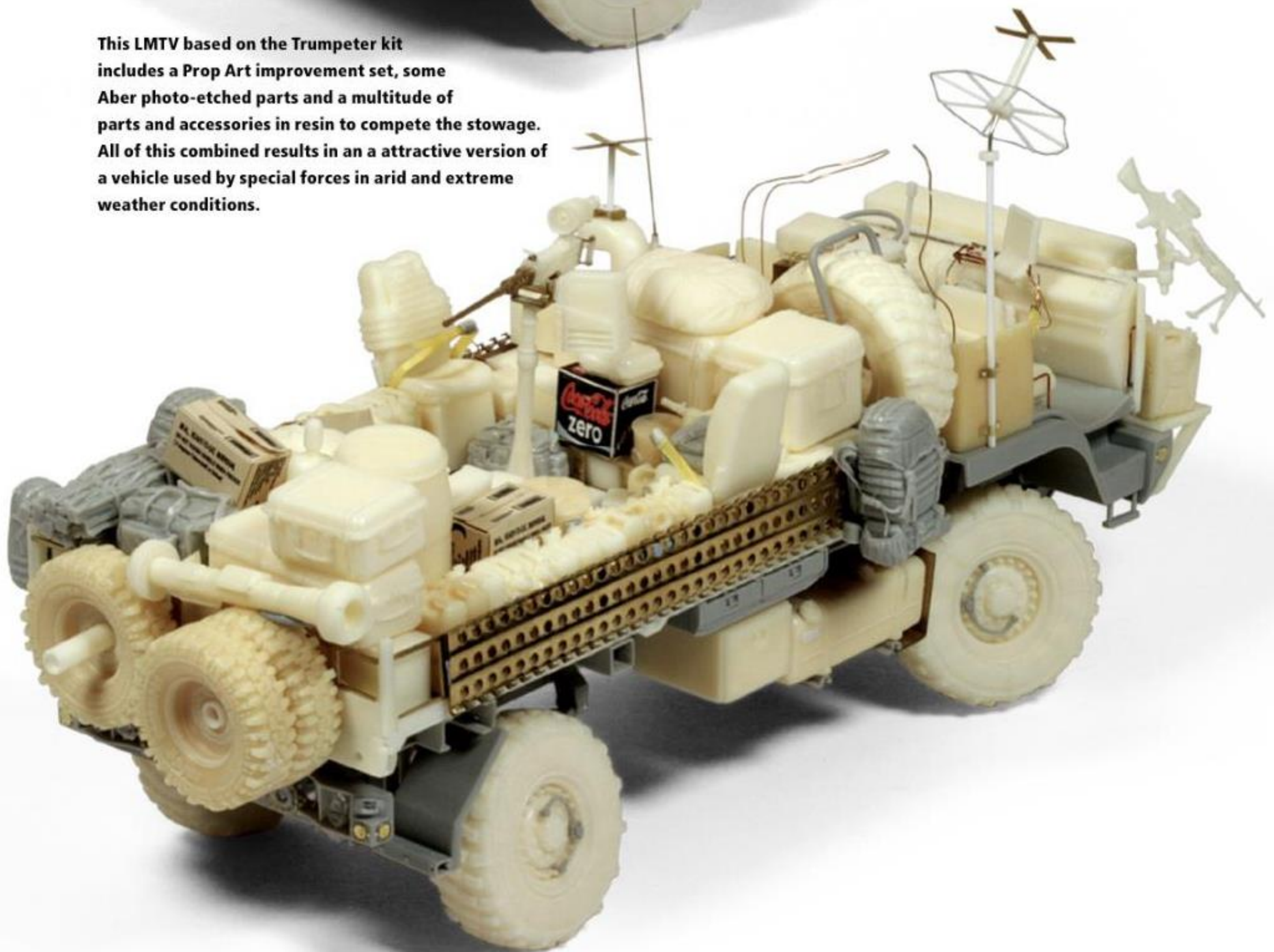
(23). Sometimes we can also add some home-made details to the resin set, as in the case of the machine gun on this vehicle.

(24). Certain details can only be obtained with improvement sets.

(25). The resin communications equipment has been detailed with wiring.



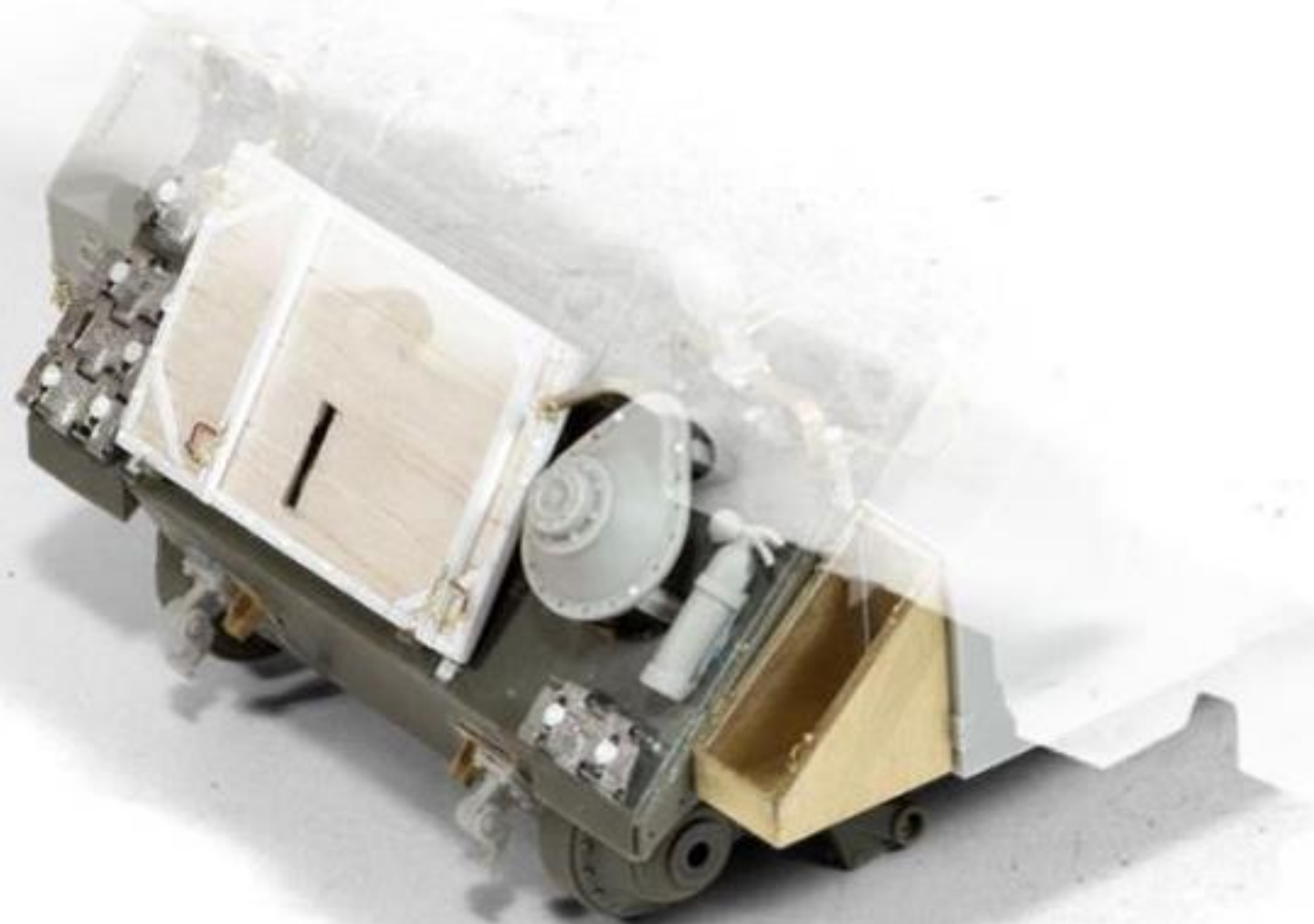
This LMTV based on the Trumpeter kit includes a Prop Art improvement set, some Aber photo-etched parts and a multitude of parts and accessories in resin to complete the stowage. All of this combined results in an attractive version of a vehicle used by special forces in arid and extreme weather conditions.



Tamiya Ford Mutt with a lot of resin improvements and a commercial PE set to transform it into the IDF version, combining both original and home-made parts.



This IDF M113 is characterised by the amount of improvements and additions to update this obsolete kit. Among them you can see resin boxes, PE parts and some home-made improvements.



II.1.3.

SUPERDETAILING WITH PHOTOETCH

A real torture for some modelers and a must for others. Many people consider photo-etch the king of superdetailing. The name actually describes the production process. Photographs or drawings of actual parts are used to create digital files which are turned into metal sheets with photo-sensitive substances.

In the past photo-etched sheets were sold individually by manufacturers who offered them as a complement to a model kit, in order to replace or detail certain parts.

In the course of time many plastic kit manufacturers started to include basic photo-etch sets in their kits. Nowadays almost all kits have some PE included.

Next we will see how to deal with photo-etched metal parts, as well as the results they can yield when detailing a model.

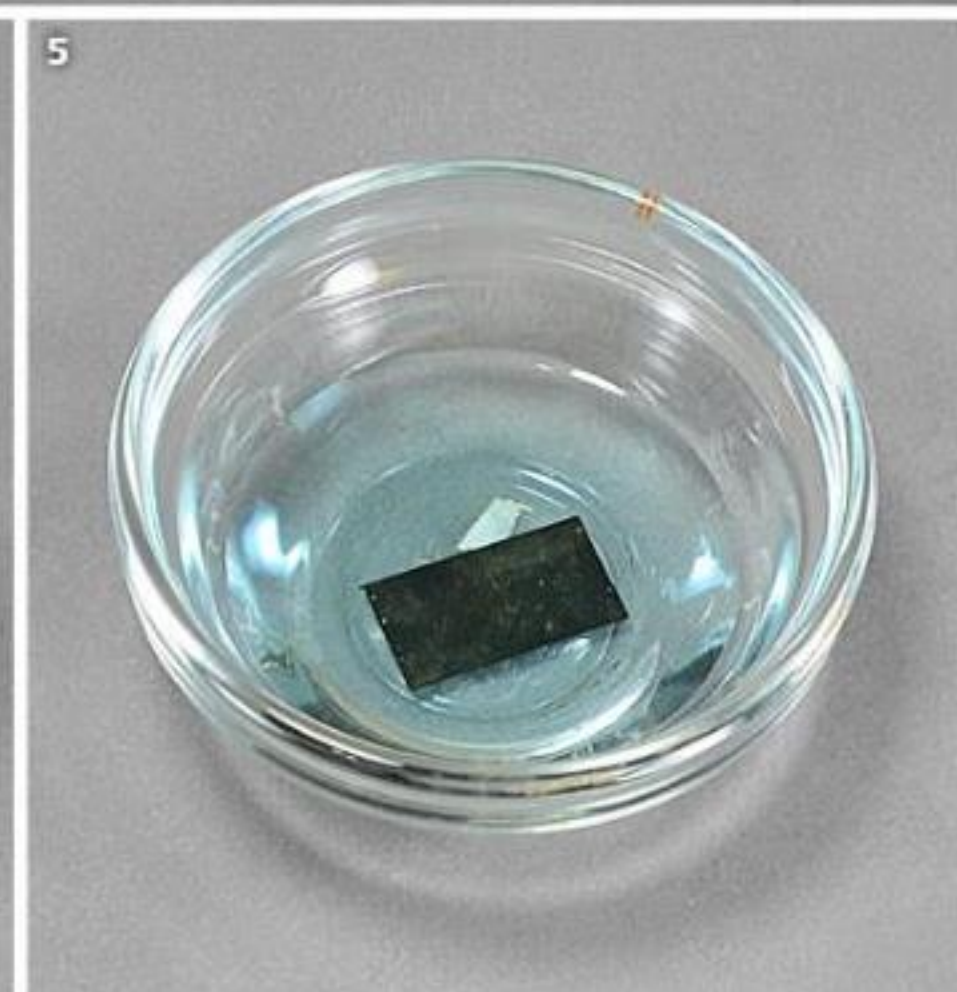
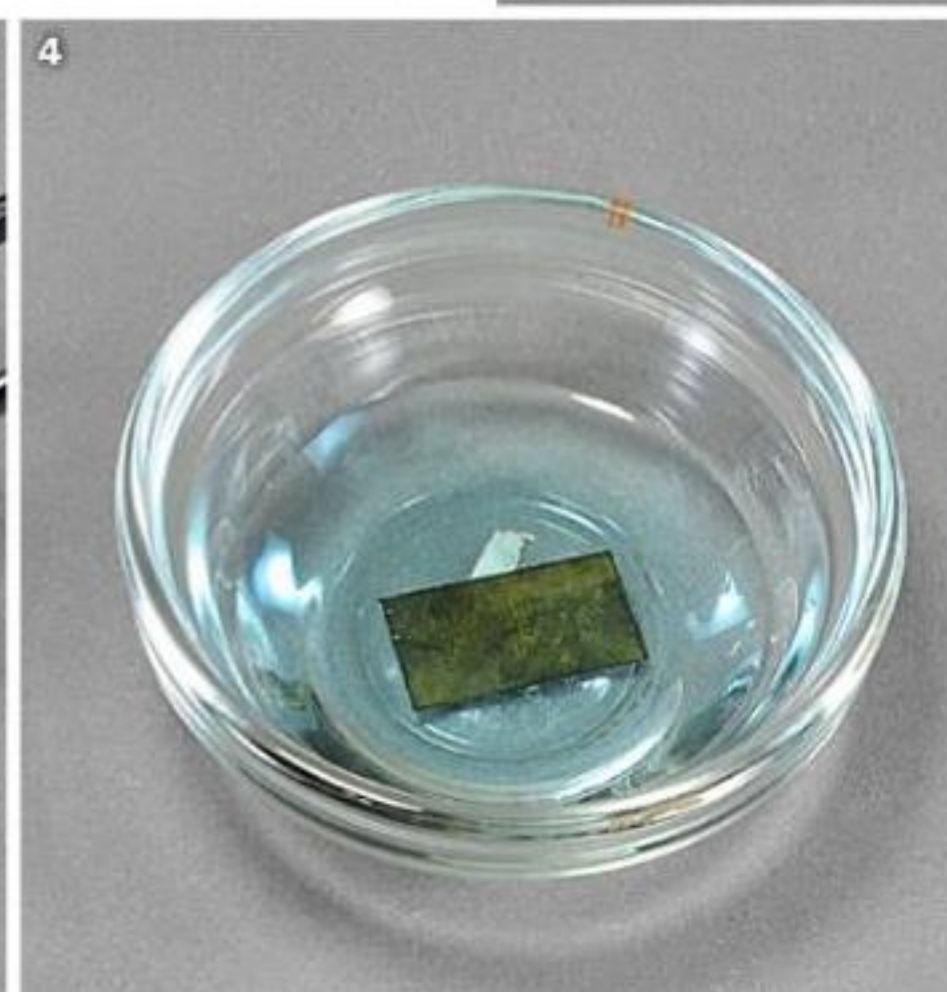
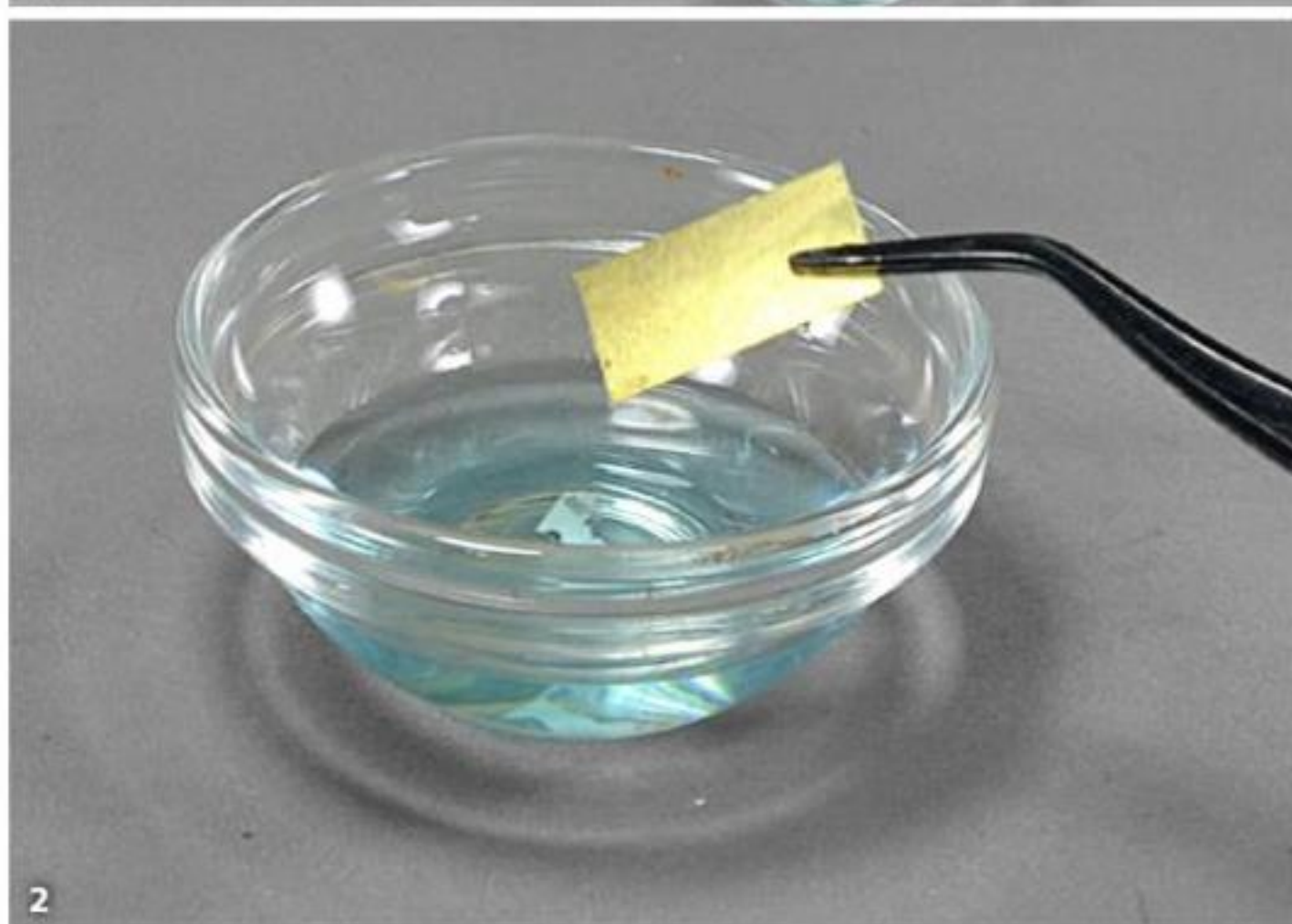
Burnishing fluids

(1). The most prominent characteristic of photo-etch is the gold or silver colour of the sheets, depending on what material the manufacturer used. The surface is rather glossy and needs to be treated for easy painting. AK174 Photoetch Burnishing liquid is a product that results in a matte and dark patina of the PE parts and this improves the grip of the paint.

(2). We will pour a bit of fluid in a container so that we can completely submerge the part. Before you dip the part in the fluid it is best to clean it thoroughly with acetone. Wear latex gloves and use tweezers to prevent contact with your skin.

(3). Once submerged we shake it a little to eliminate the bubbles that may have stuck to the surface.

(4, 5). After a couple of minutes we can see that the patina is changing. The part must remain submerged for about 5 to 8 minutes to obtain the final dark and matte look.

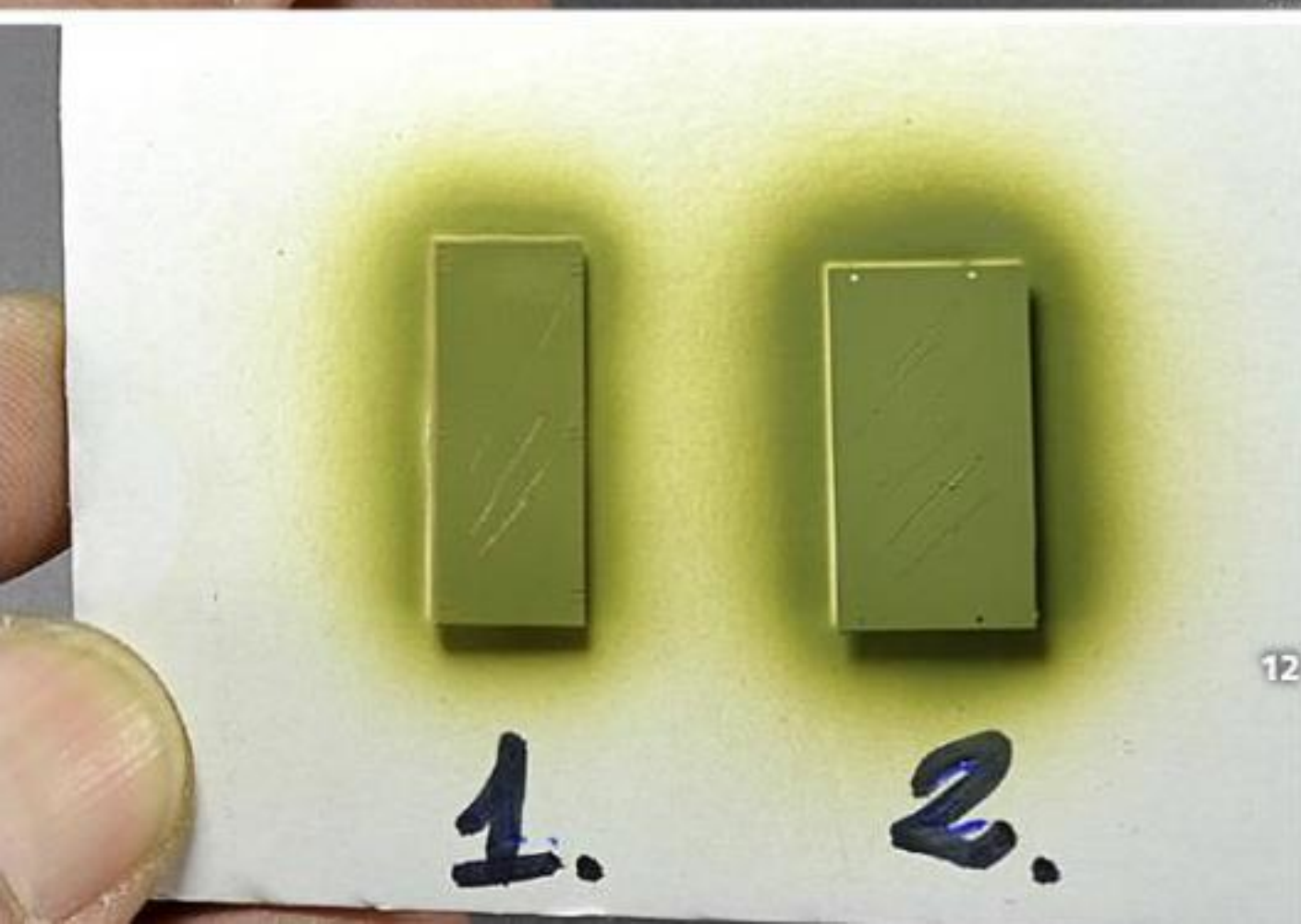
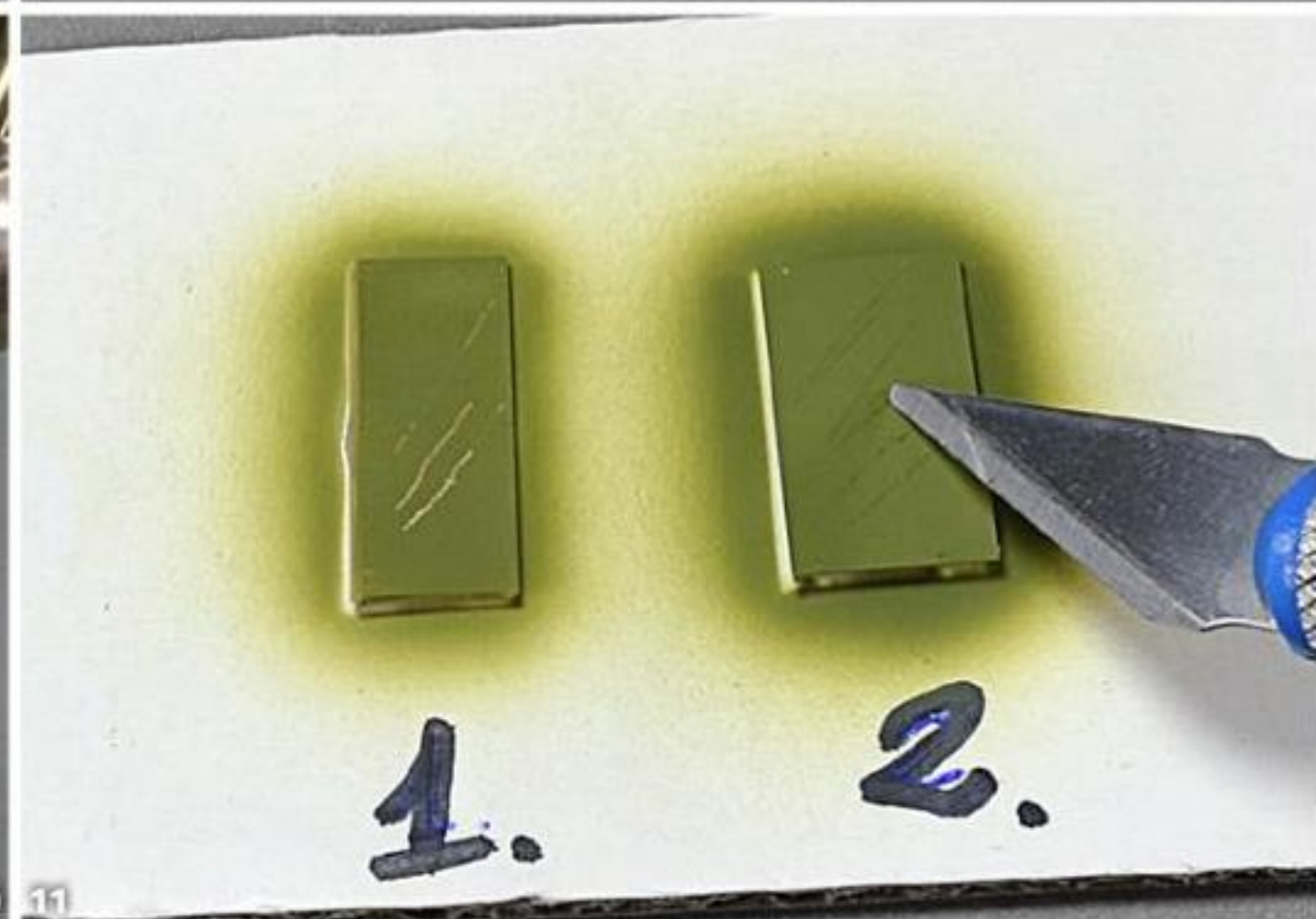
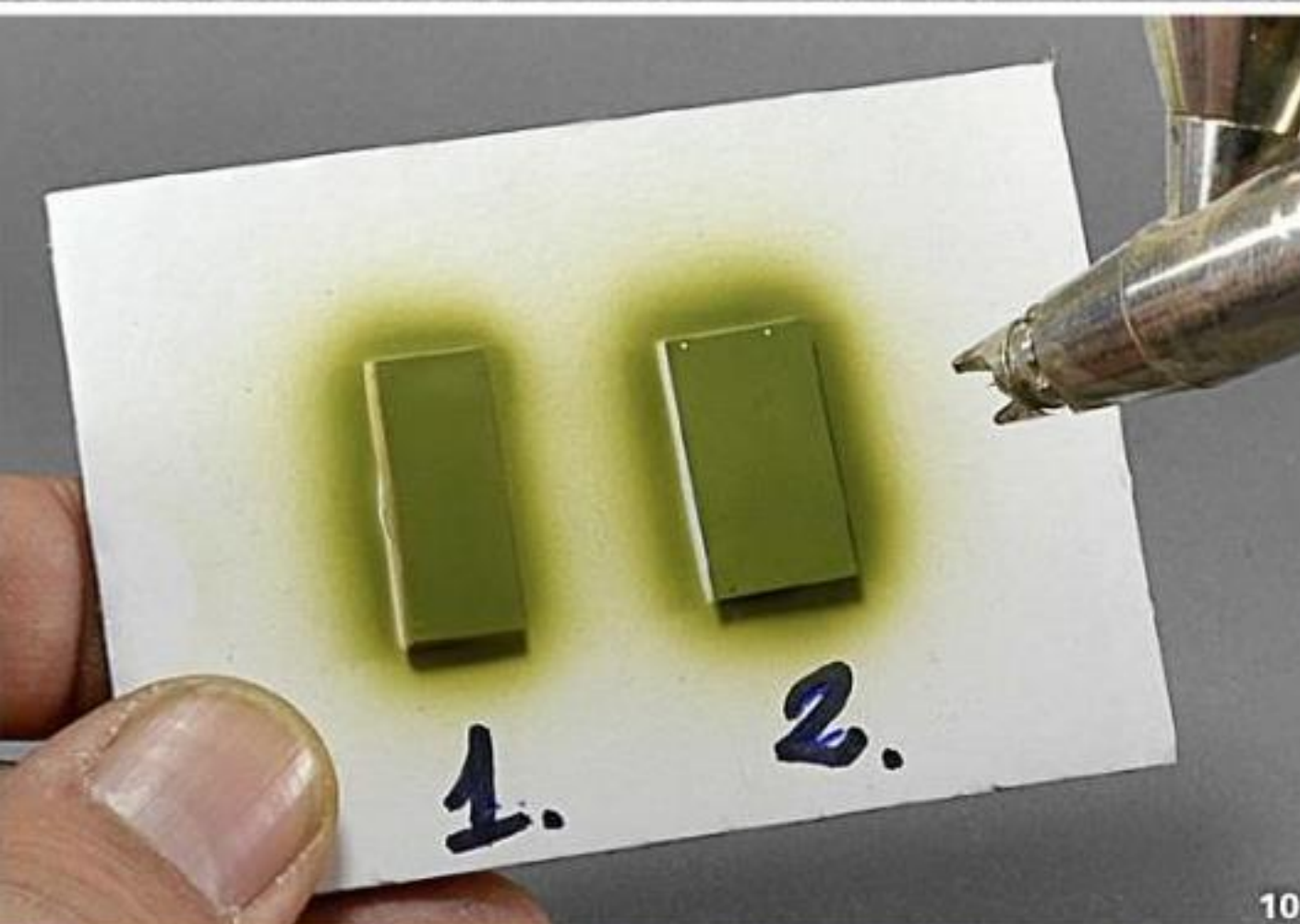
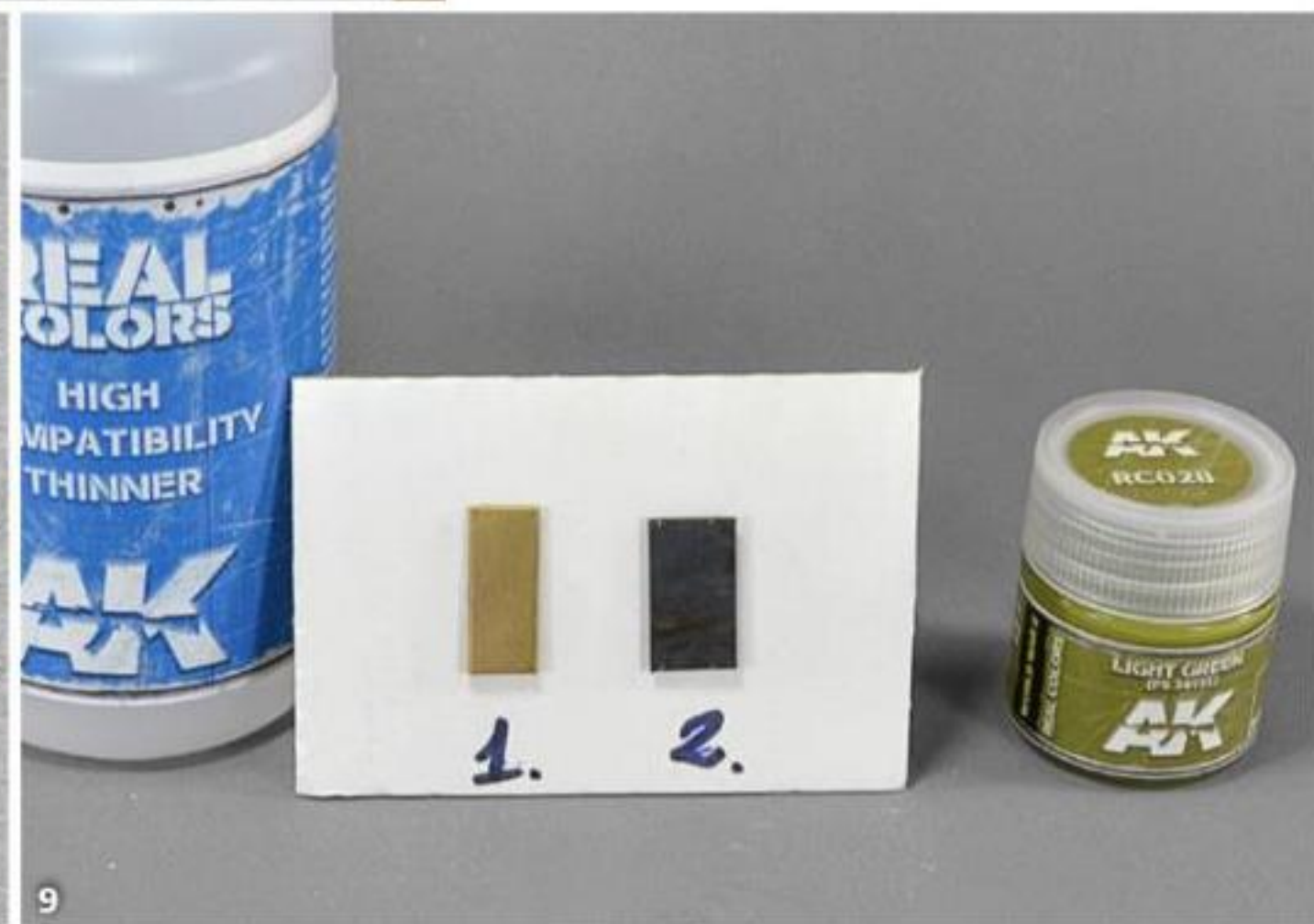
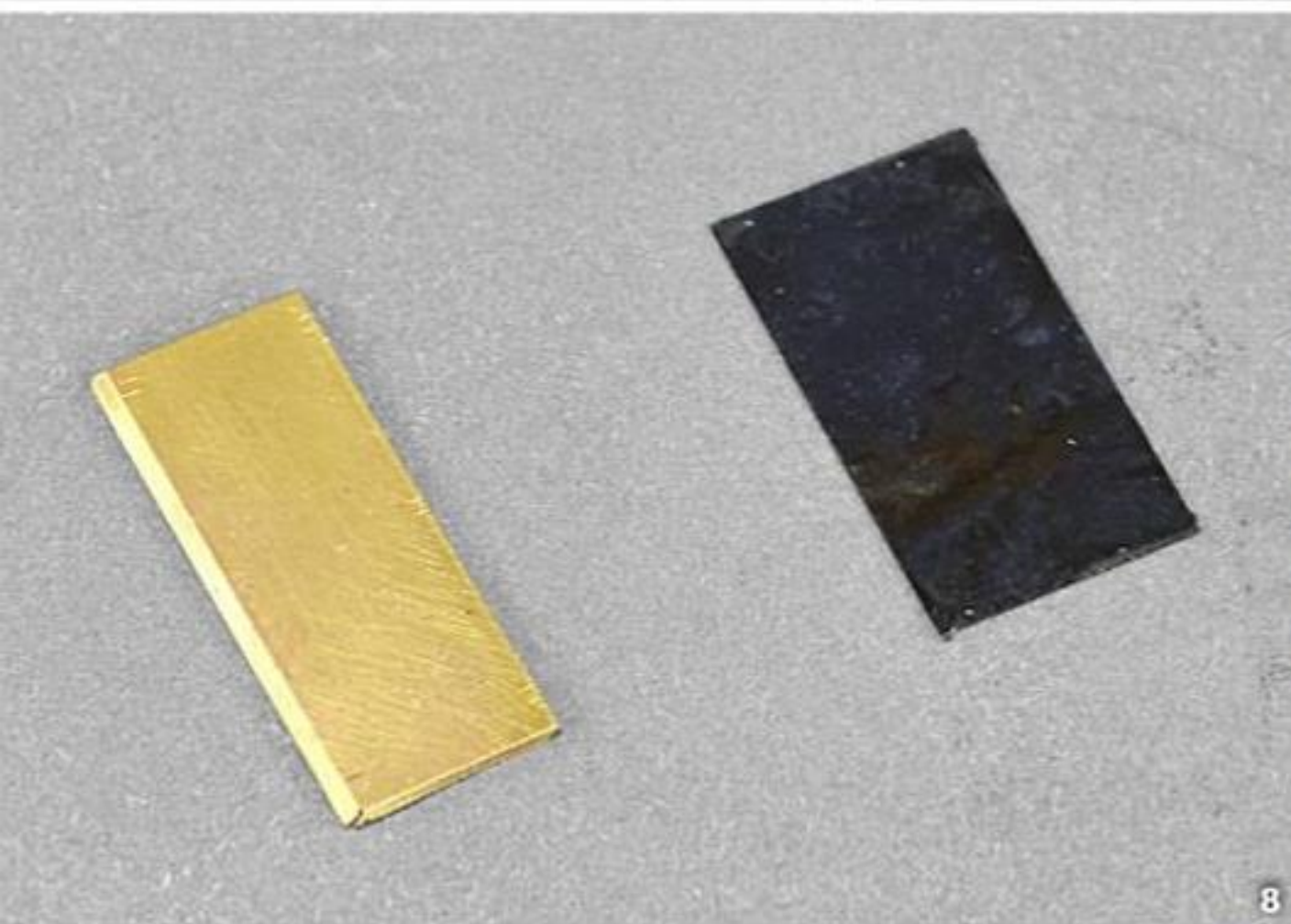




(6, 7). After the required time in the fluid we remove the part and dry it well with a piece of absorbent paper.

(8). This picture clearly shows the difference between an untreated part and a burnished one. The result is obvious.

(9). We are going to do a test applying paint on both parts to check their behaviour.



(10). We airbrush the same color on both parts.

(11). Apparently the finish is similar but when we scratch both surfaces with the blade we clearly see the difference.

(12). While on the untreated piece (on the left in the picture) the paint chips with relative ease, on the treated piece (on the right in the picture) we need to apply more pressure to obtain appreciable results.

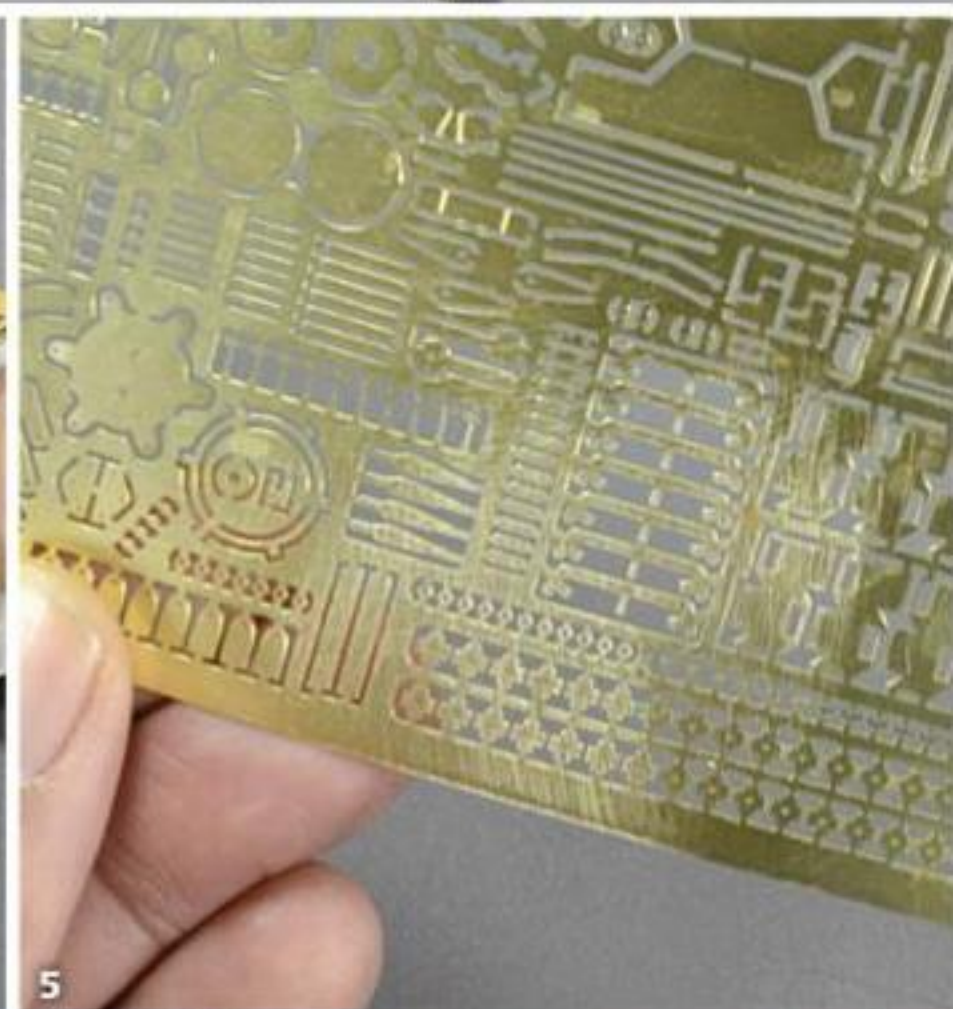
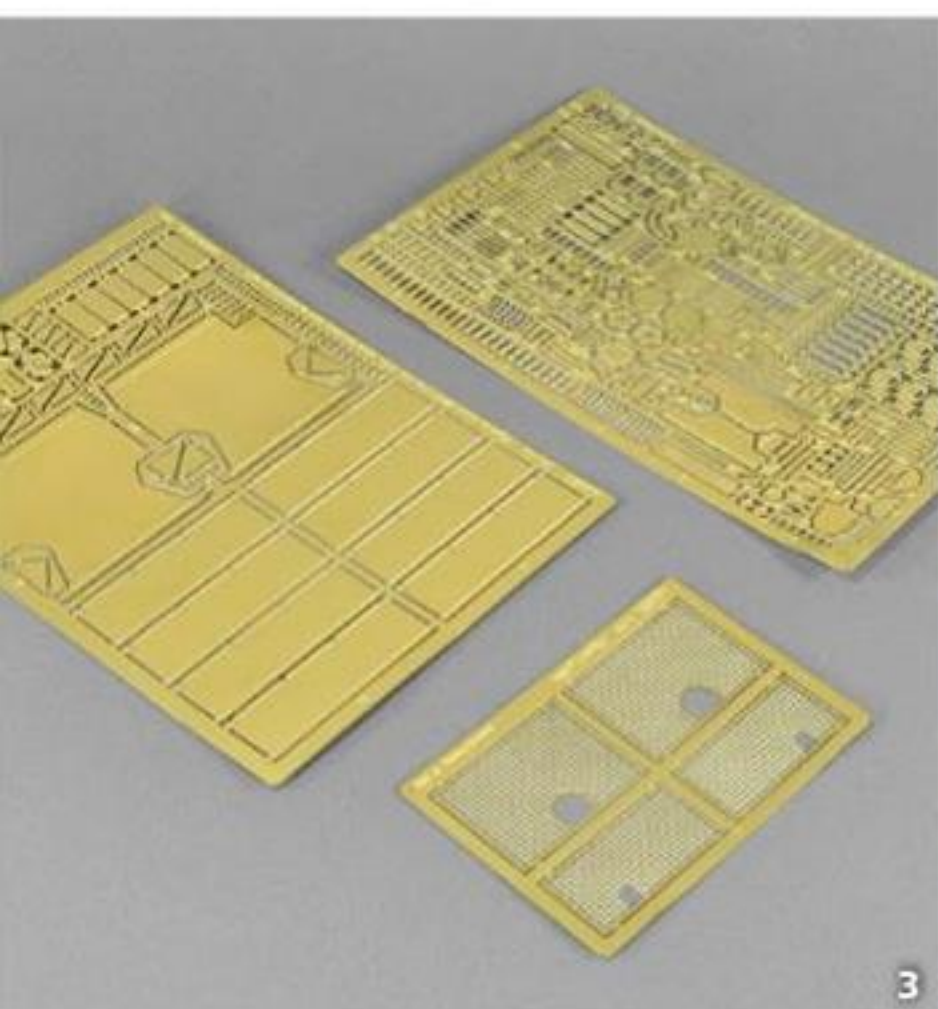
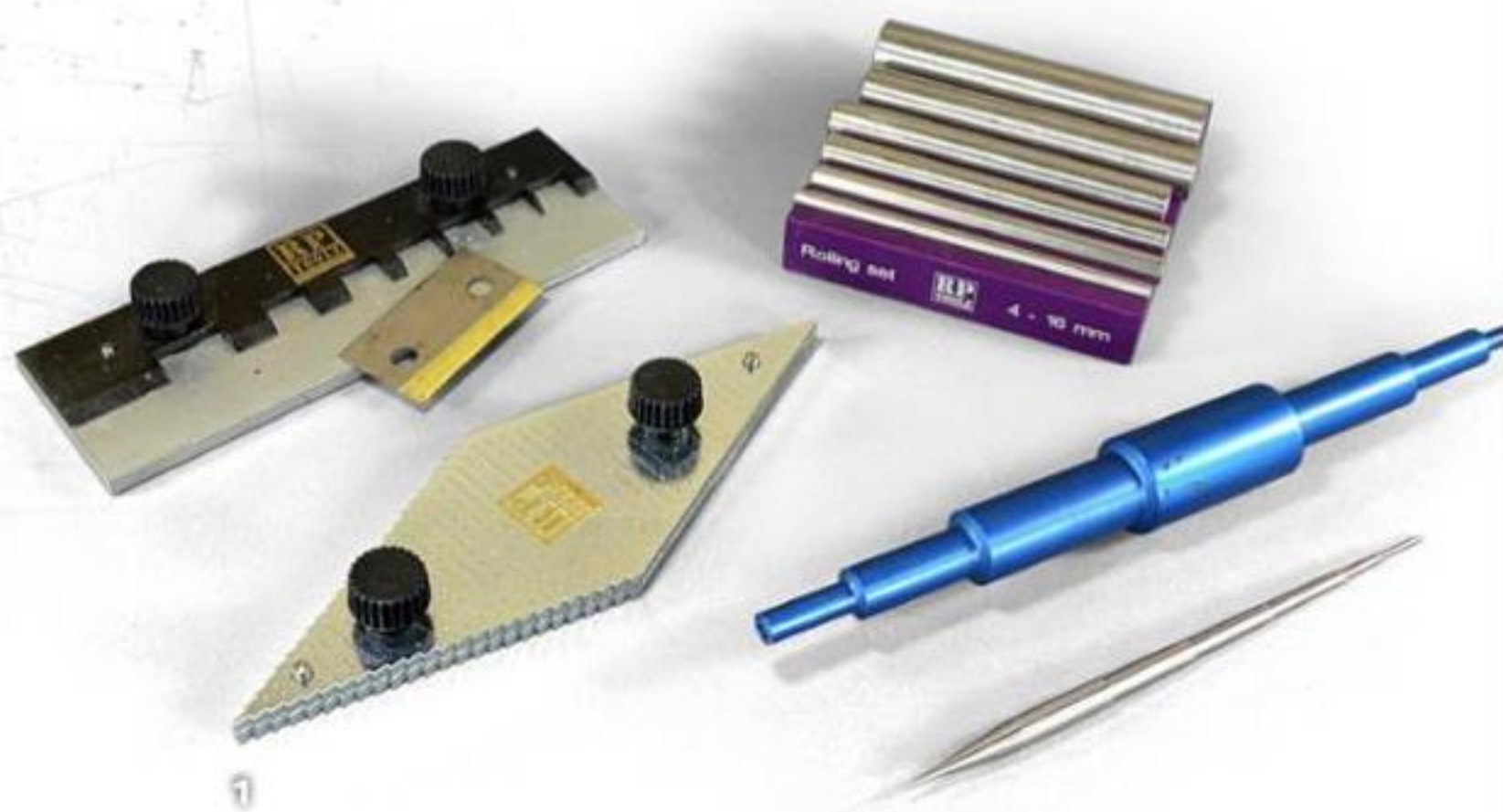
Superdetailing

(1). Working with PE requires some quite specific tools. There are many tools on the market that allow us to shape metal and obtain the right parts for improving model kits. Here we show several examples of benders and tools to make handles of various sizes. There are different manufacturers and price ranges to consider.

(2). In addition to the specific tools we must rely on some more common ones such as various types of files and sandpapers, needles or applicators for cyano, tweezers, flat pliers, a metal ruler and some other tools that may come in handy.

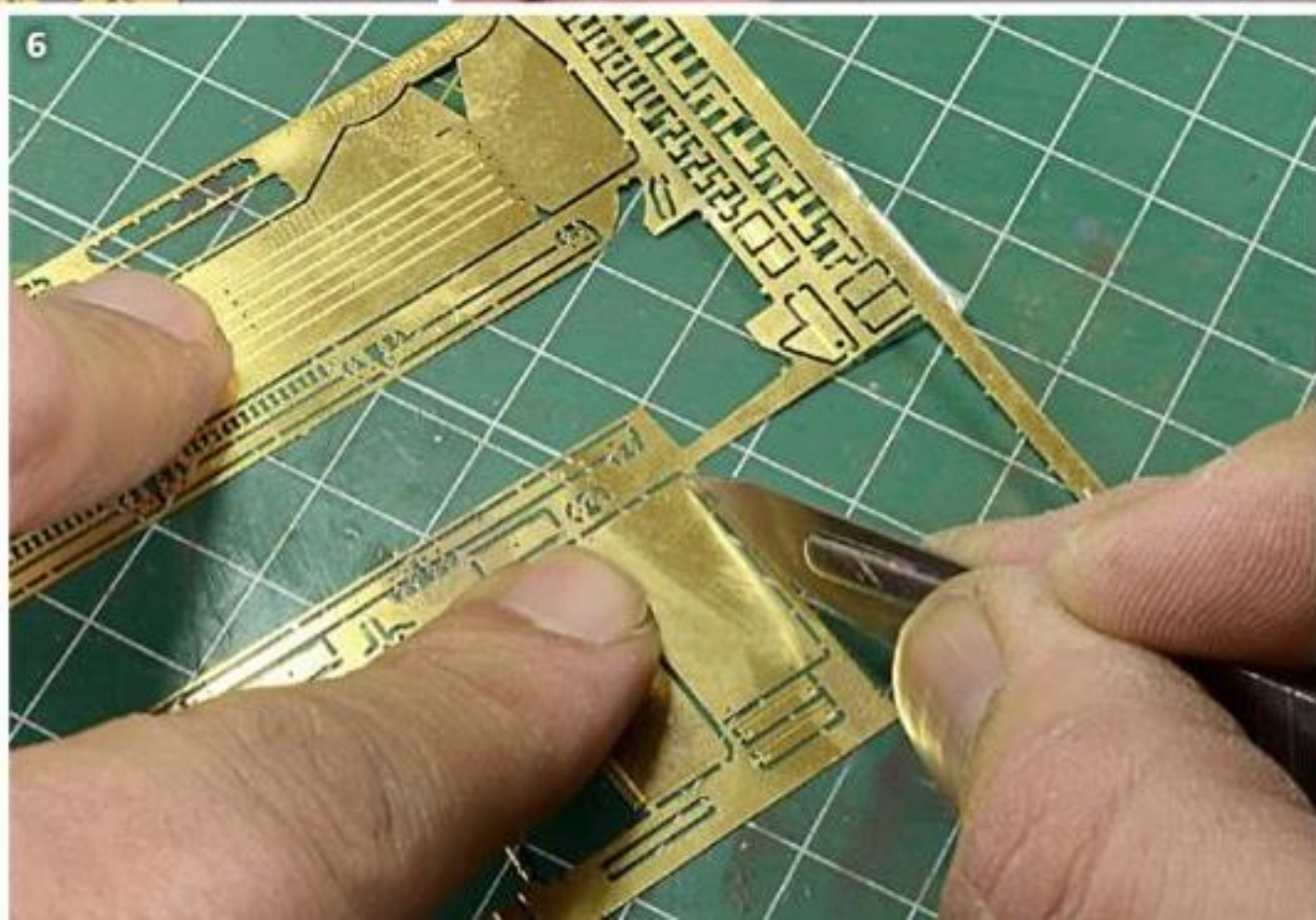
(3). As a rule the parts are attached to a sheet that we should treat with care as not to bend them improperly.

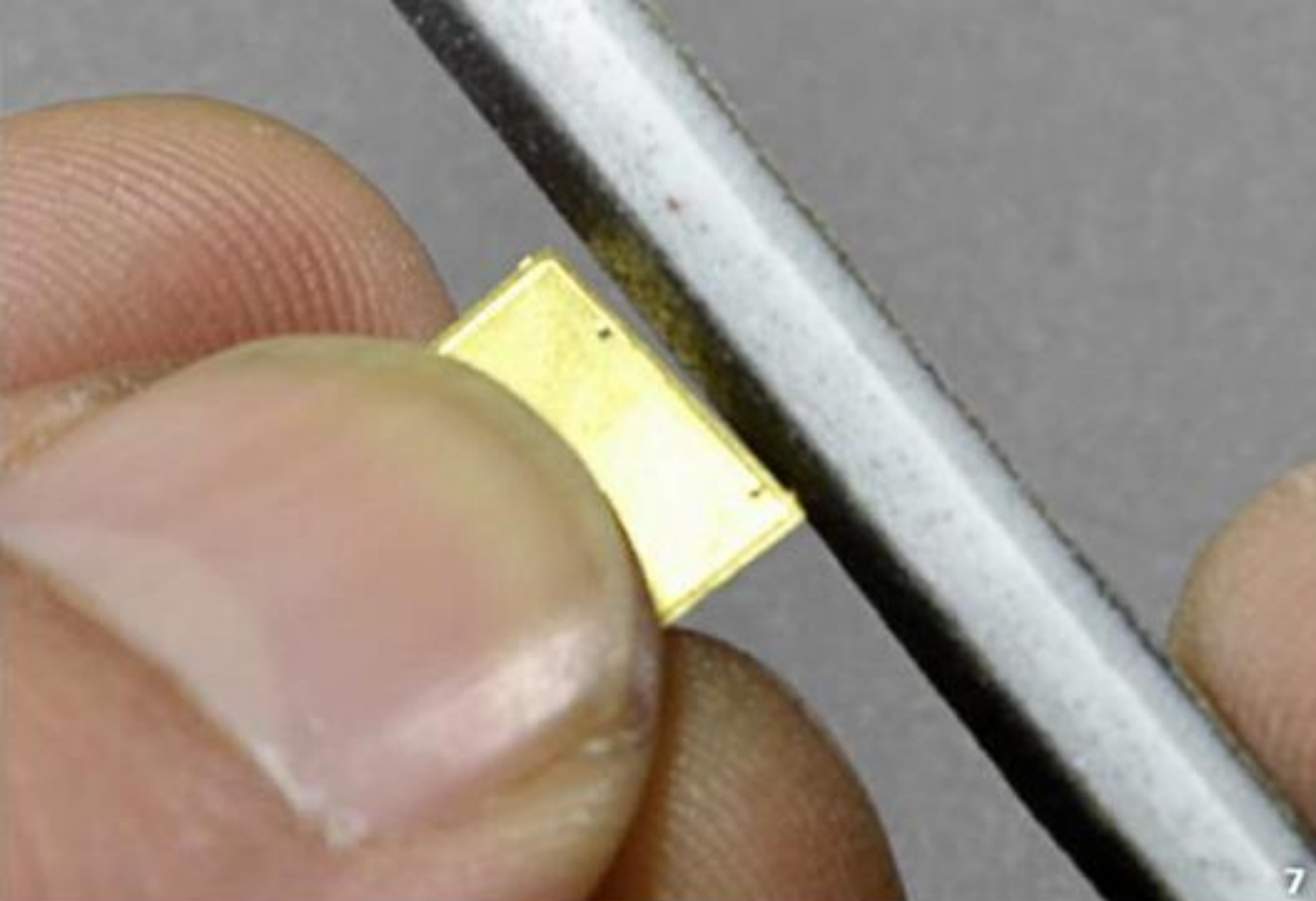
(4). As a prior step, whether or not we use a burnishing liquid, we will need to sand the whole fret to create a porous surface facilitating its adhesion.



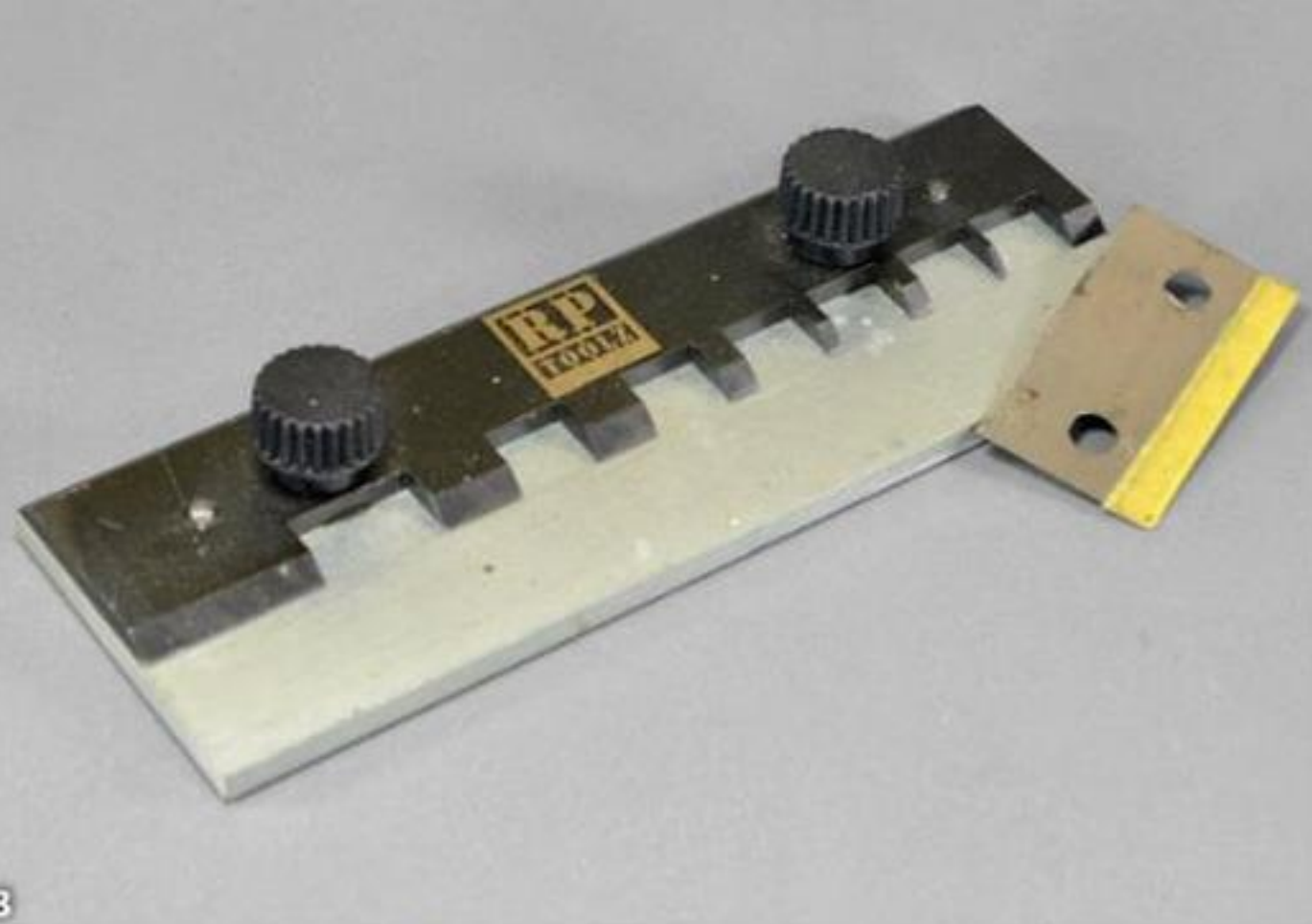
(5). You can see that after sanding the surface its brightness disappears and that it becomes porous for a better grip of the cyano.

(6). For removing the parts from the fret is convenient to use a sharp knife. Perform this task on a smooth and hard surface so that the part and PE sheet don't bend.

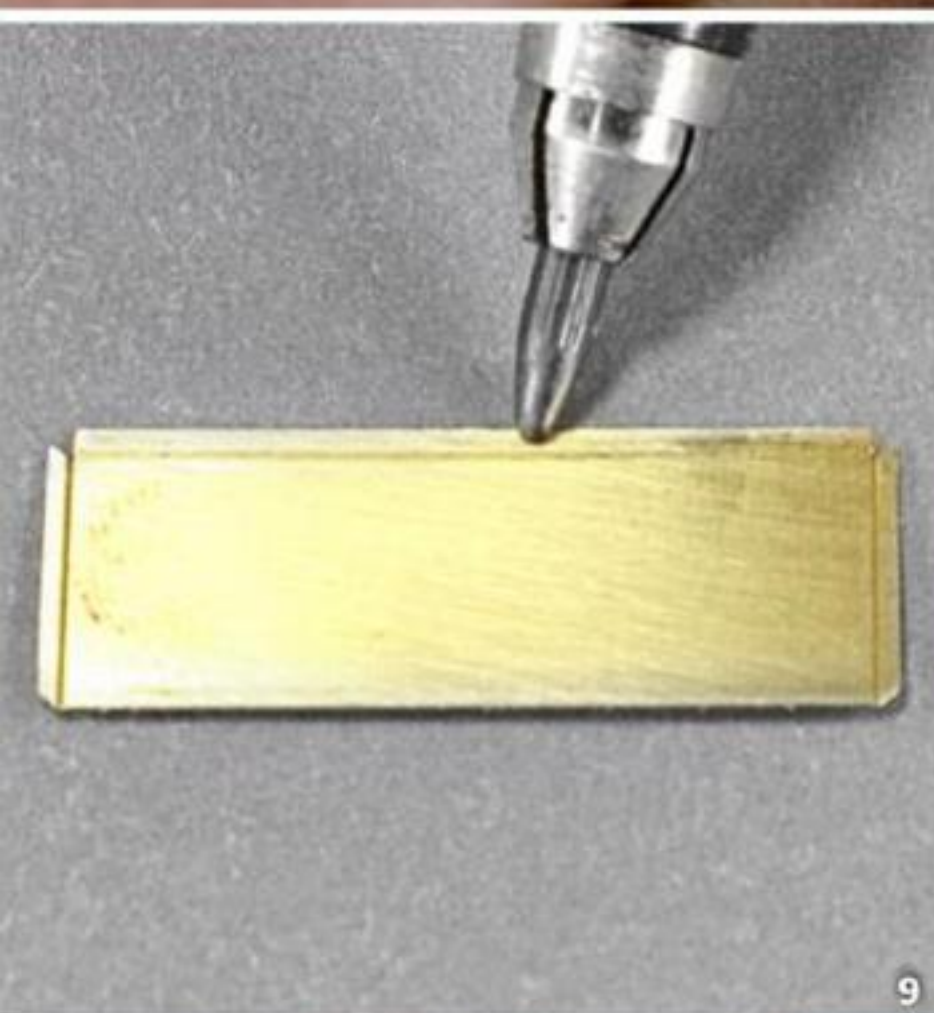




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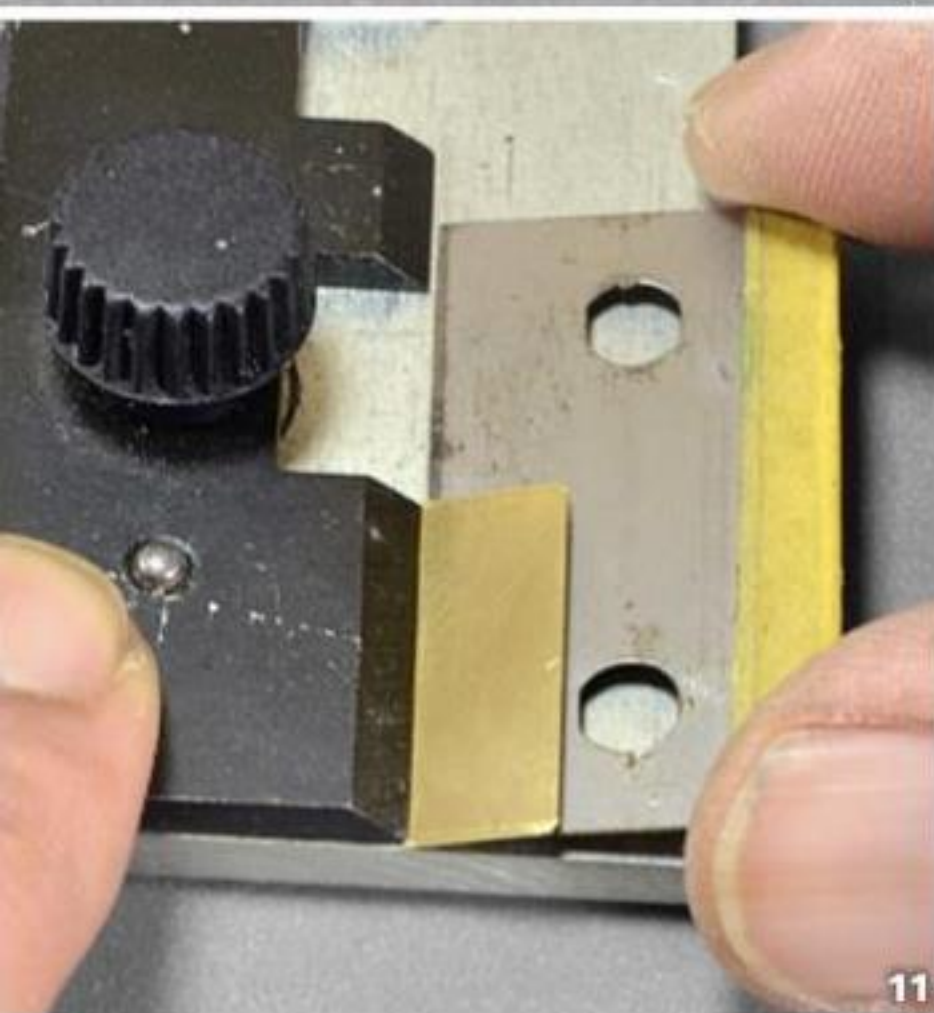
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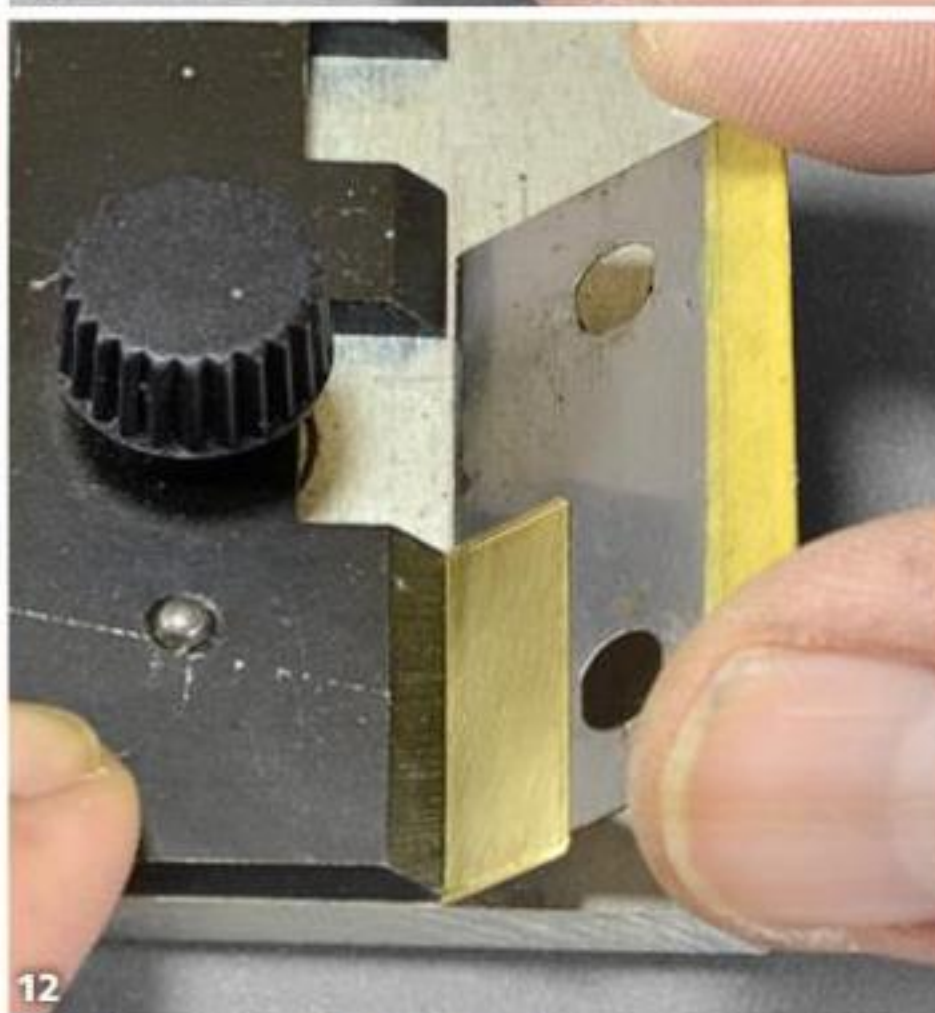
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(7). We use flat files to remove the possible burrs of the fret that remain on the parts.

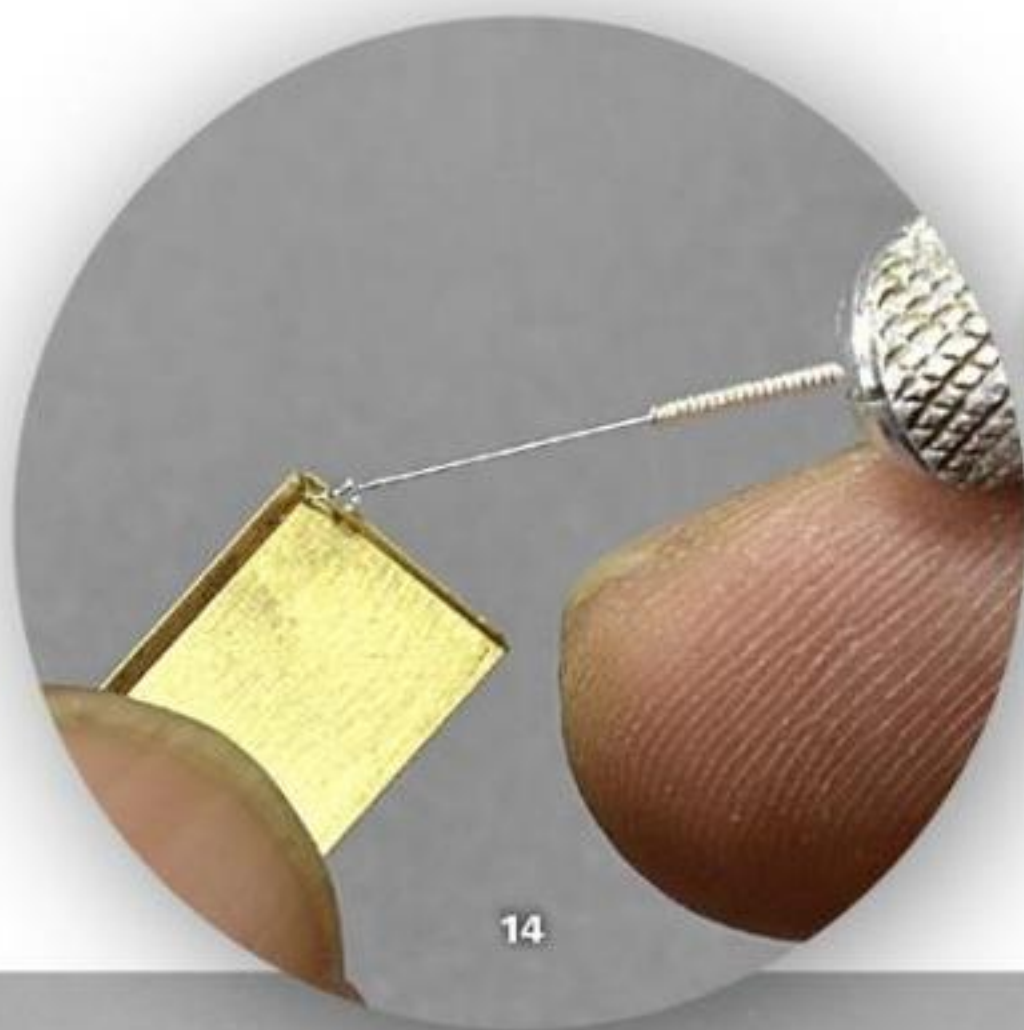
(8). The benders make the work much easier as we can hold and manipulate the parts appropriately. This tool can be found in different sizes. The one shown here has a medium size, about 13cm, It is useful for both small and medium parts.

(9). Usually the parts have slits that indicates where they must be bent.

(10). We place and fix the piece in the bender, aligning the folding line with the edge of the tool.

(11, 12). We introduce a blade between the part and the bender's base, gradually raising the blade, progressively folding the part until it obtains the proper shape.

(13). Then we can bend the rest of the part using the folding lines.



14

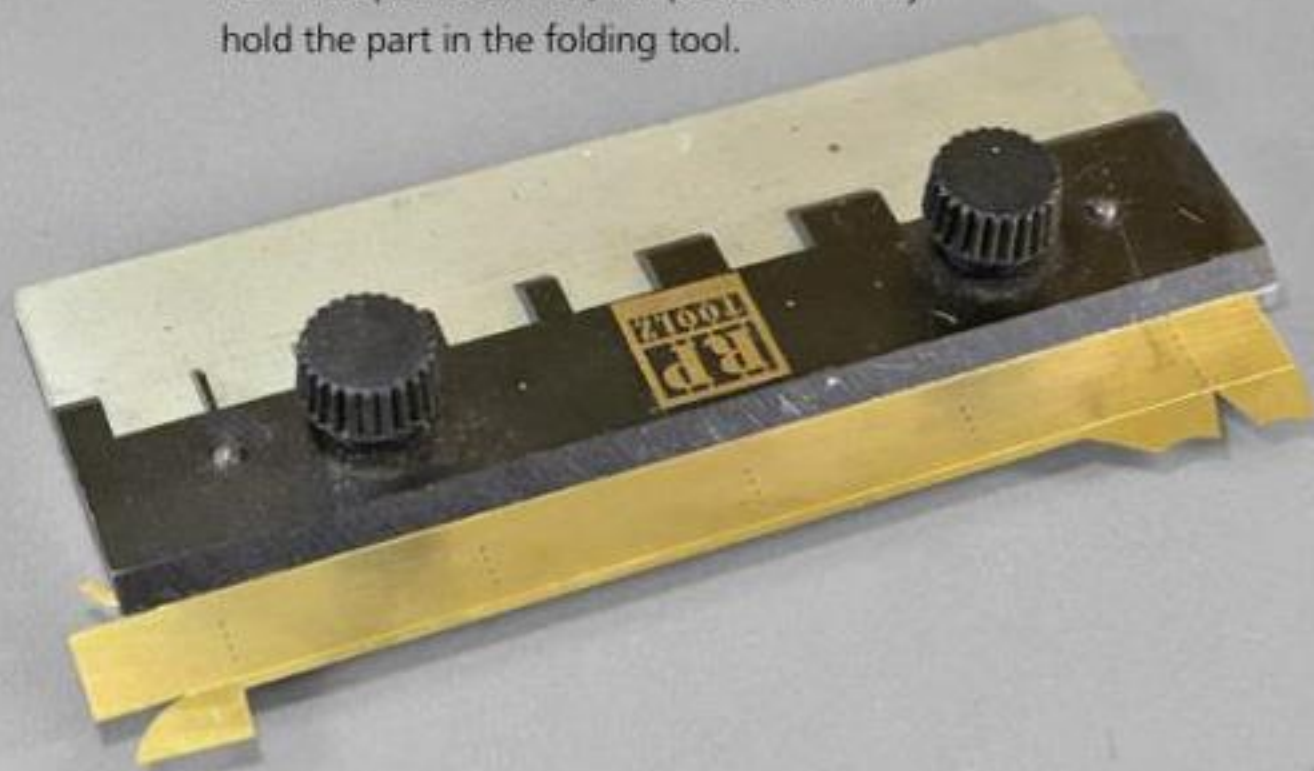


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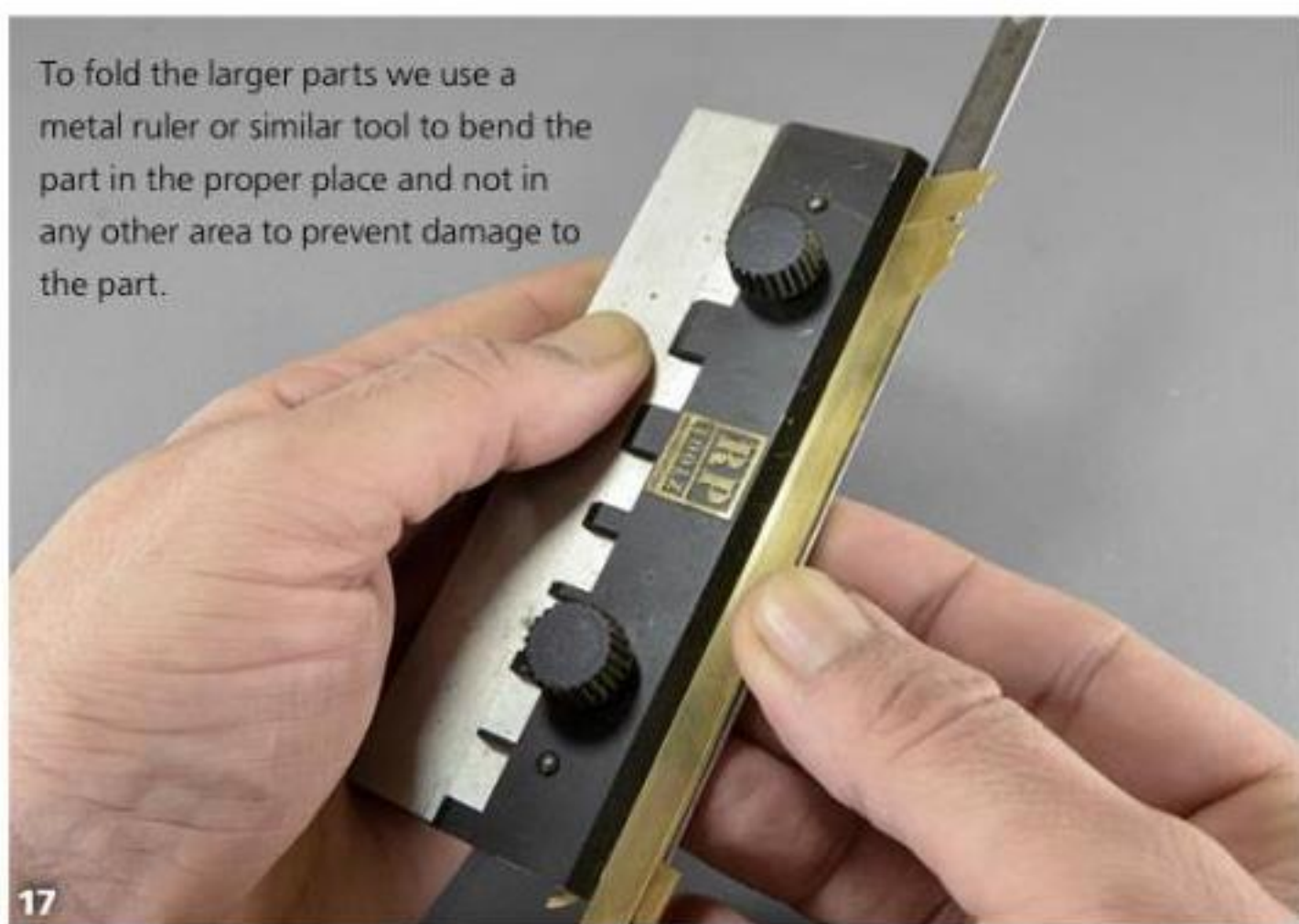
(14). Finally, with a glue applicator, we will apply a small drop of cyano in each gap. The part is ready.

(15). Let's see how we can handle a larger size part doing different folds.

As in the previous case, we place and firmly hold the part in the folding tool.

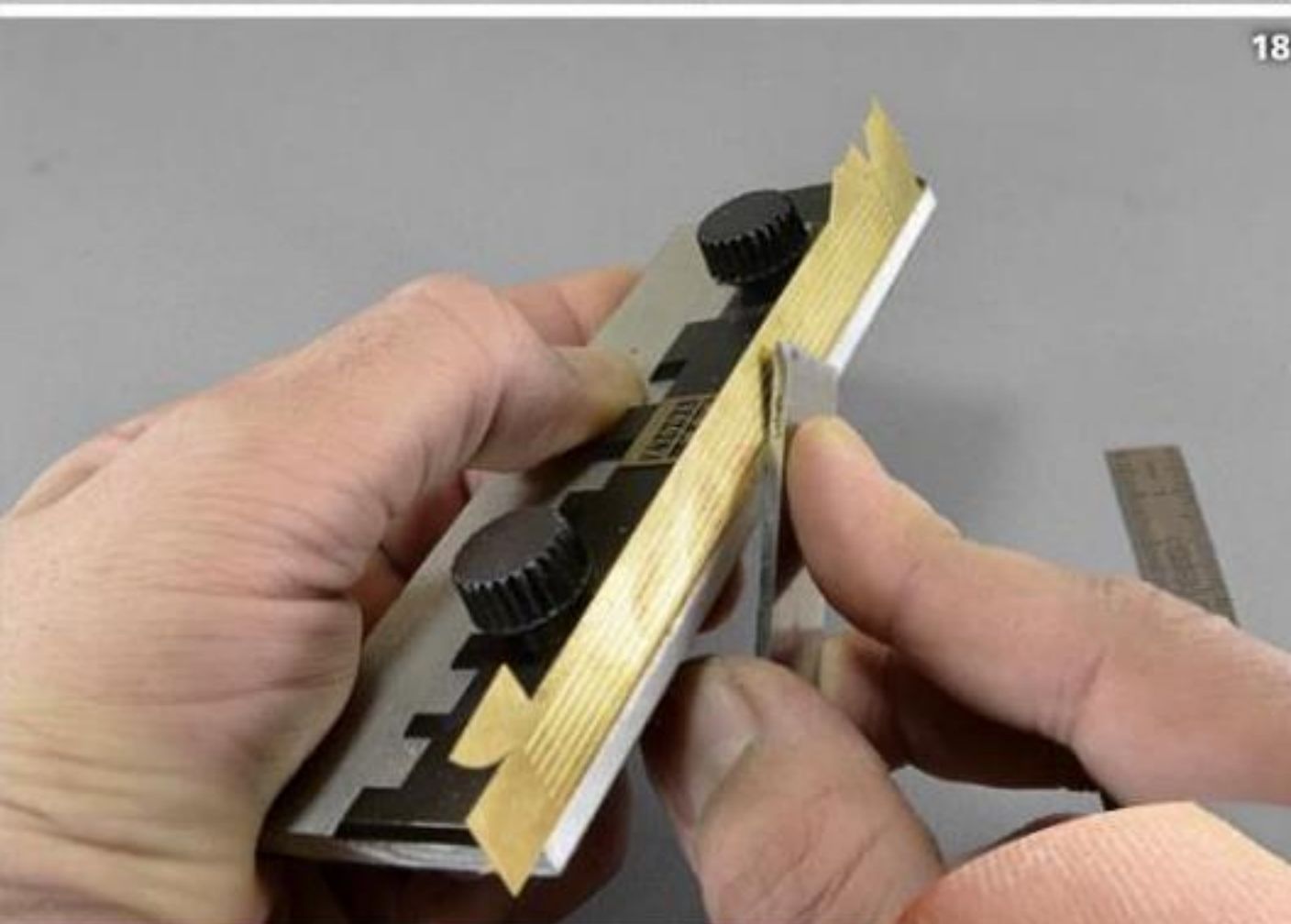


16



17

To fold the larger parts we use a metal ruler or similar tool to bend the part in the proper place and not in any other area to prevent damage to the part.



18



19

(18, 19). Once done the fold should be touched up pressing with a flat, metal tool.

(20). To properly bend the part we use a cylindrical tool with approximately the same diameter as the curve that we need to obtain.

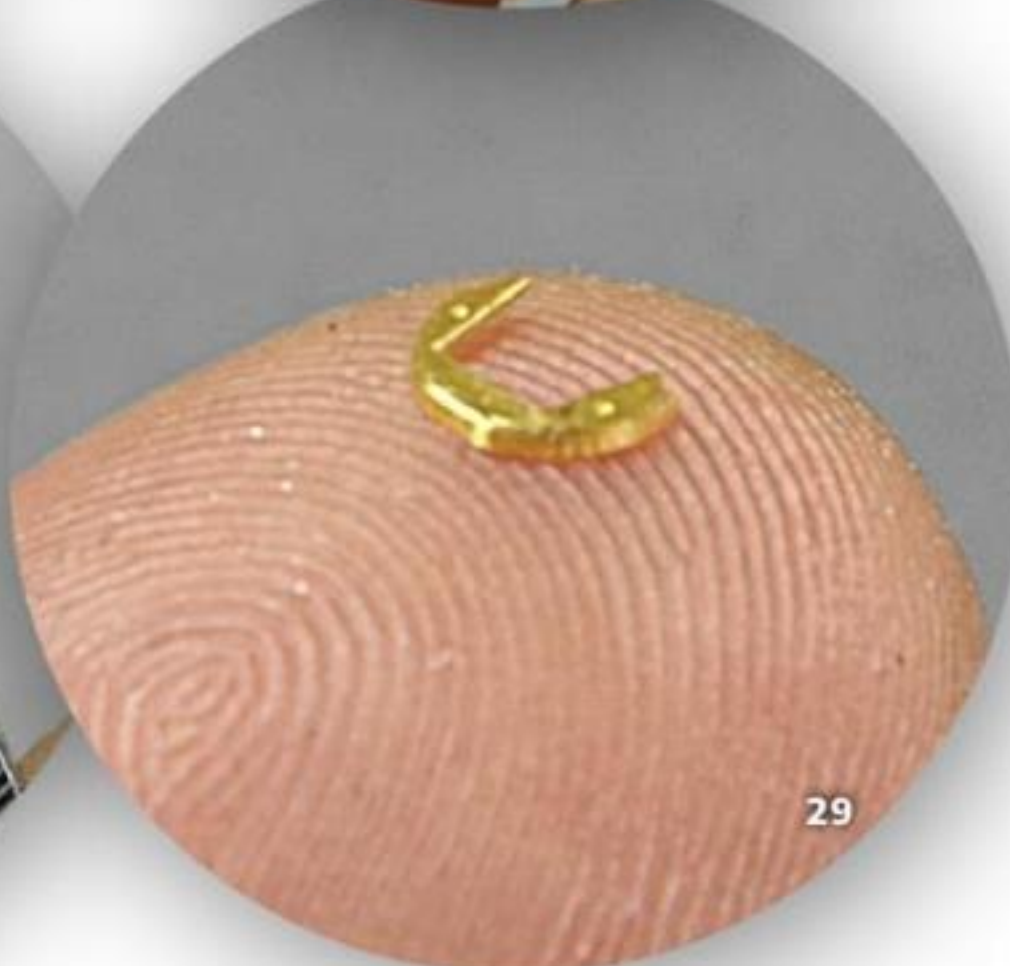
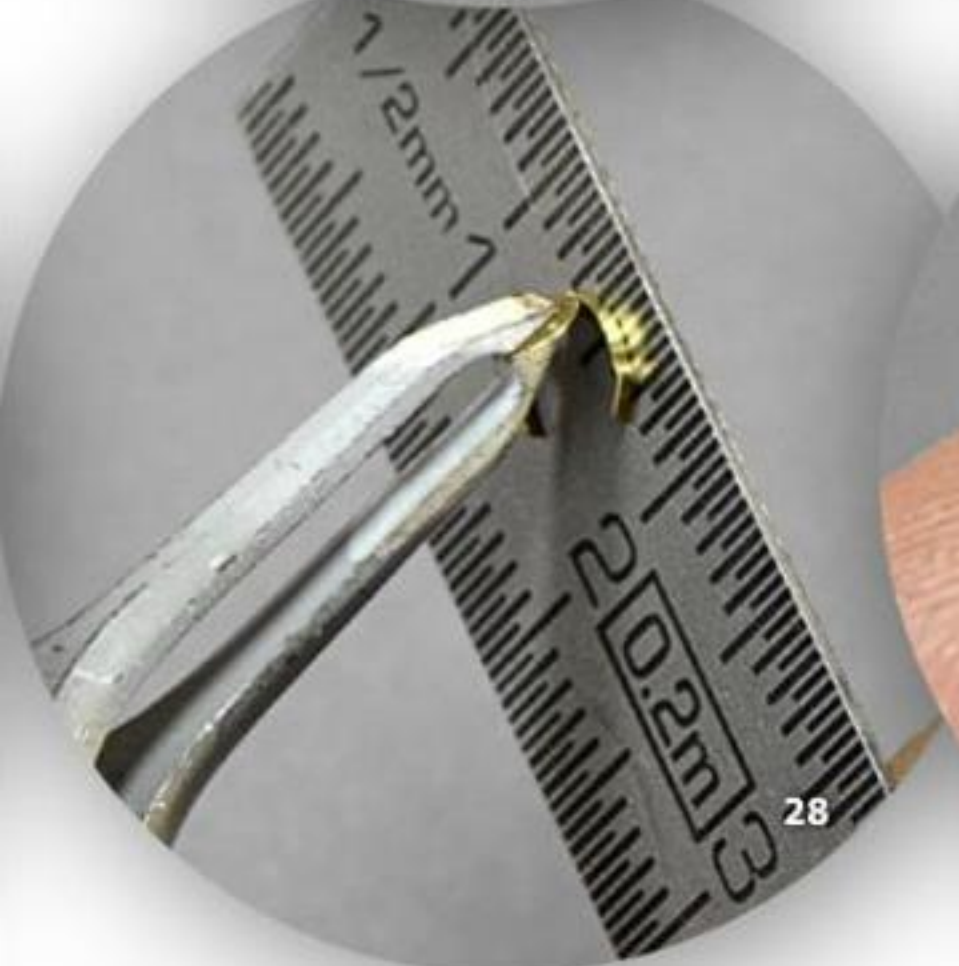
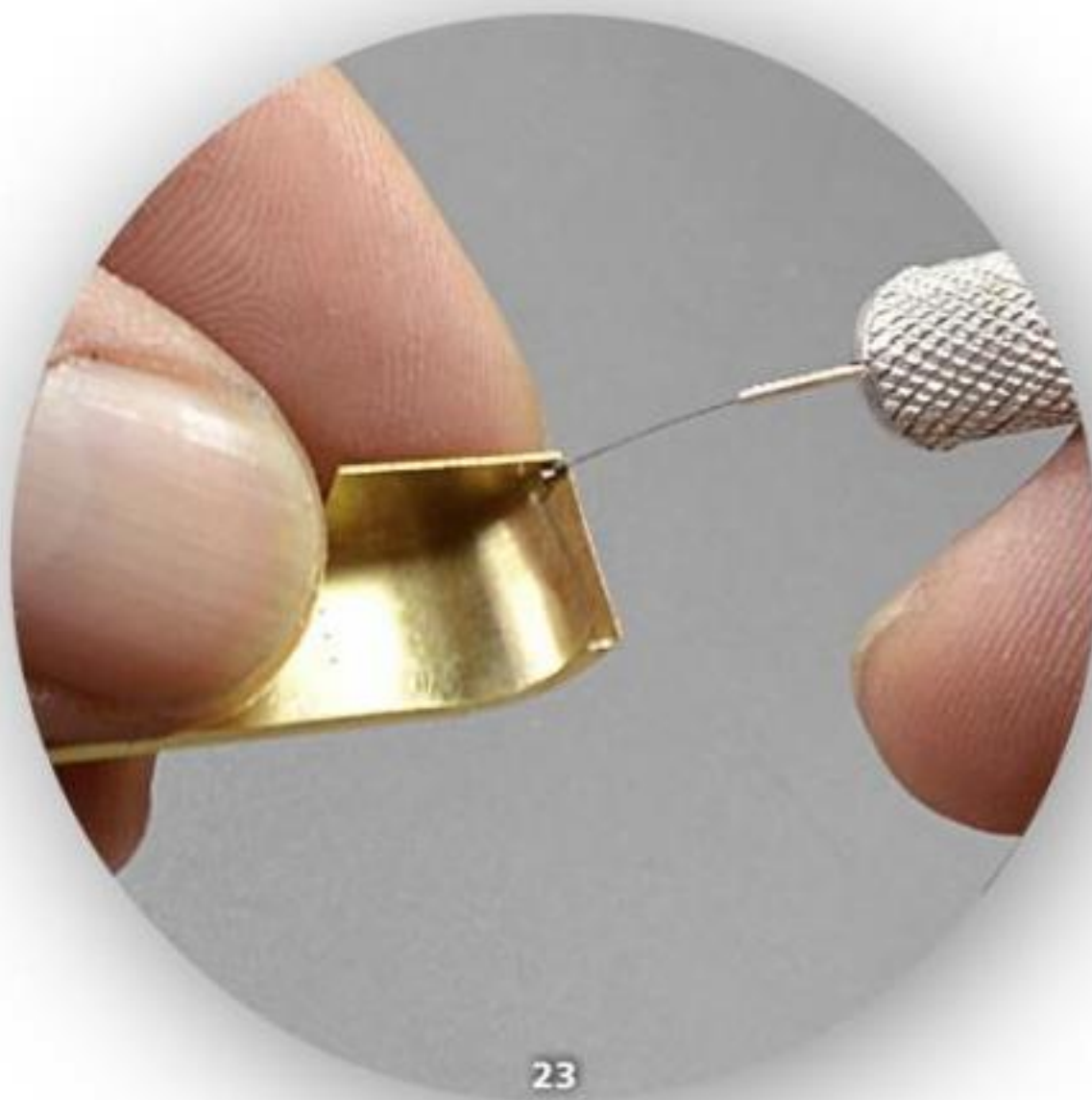
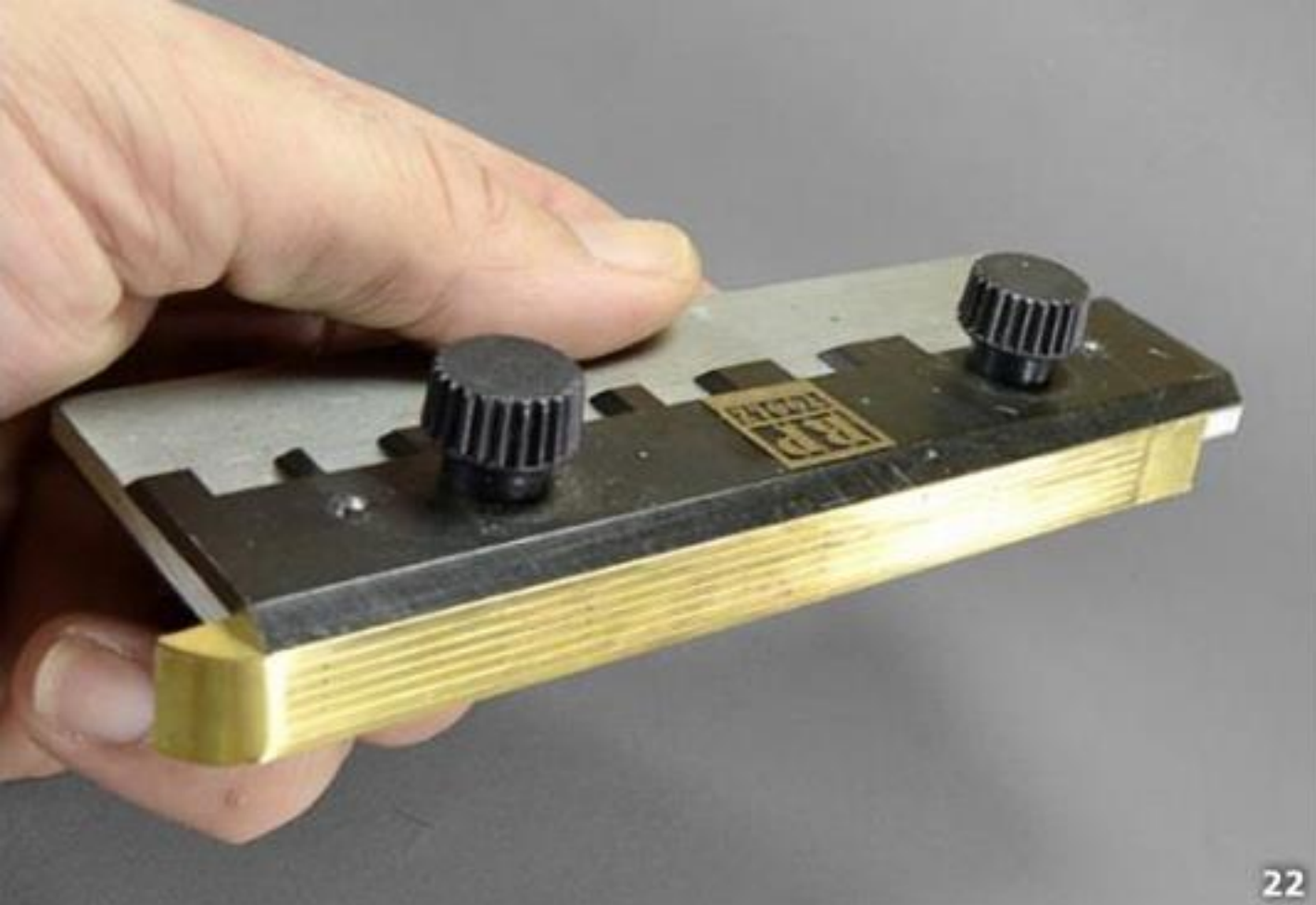
(21). We apply some pressure with our fingers until the PE part gets the desired shape.



20



21



(22). We perform the further folds as in the previous steps. It is important that the folds are perfectly aligned with each other to avoid problems when the adhesive is applied.

(23). Finally, apply the adhesive to glue all the parts.

(24). Detail of the finished part.

(25). For small parts with curved or rounded shapes this kind of tool is very helpful as it includes several working diameters.

(26). Once we determine the most suitable diameter we hold the part with tape so that it is well-aligned to the tool. This way we prevent it from moving when we are working on it.

(27). With the help of tweezers we press and shape it until it is completely folded.

(28). Pressing lightly on a flat and hard surface will join the edges. We can apply the adhesive in the gaps.

(29). The part is completely finished.



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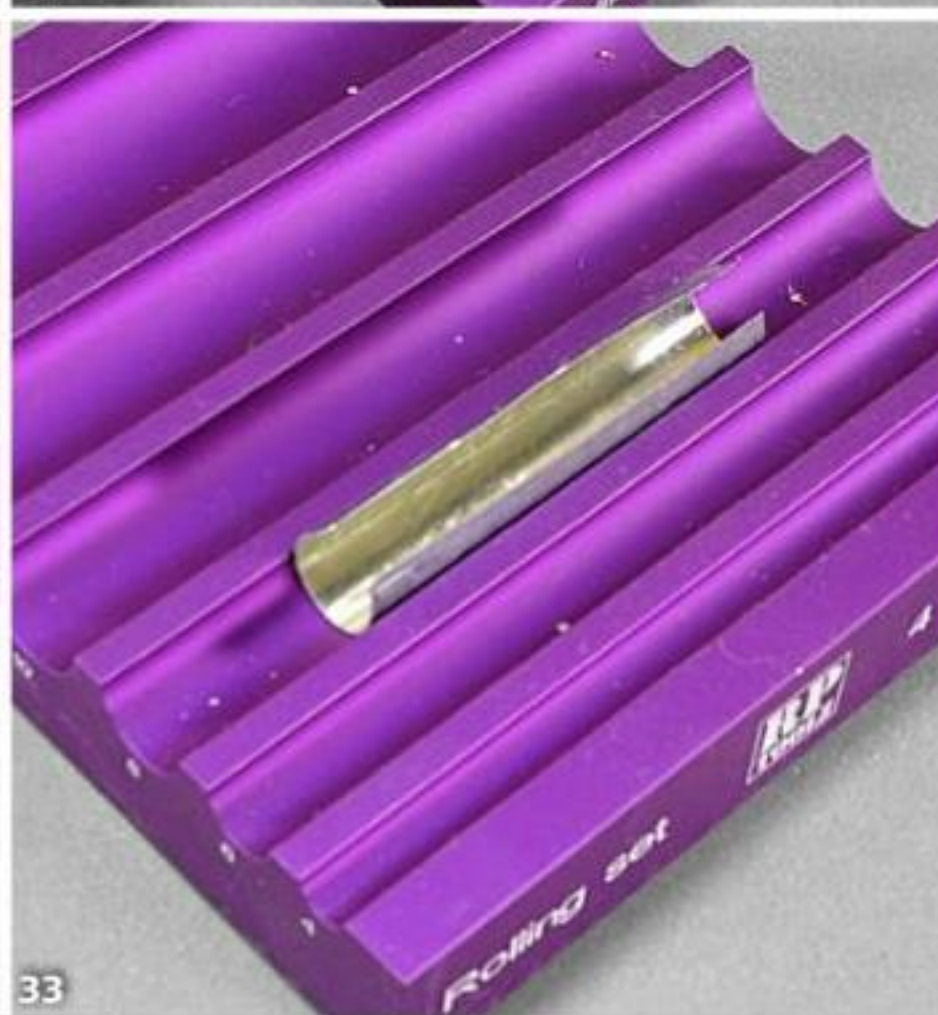
(30). We choose the right diameter of the tool based on the tube. It is advisable to start shaping the part with a larger diameter.

(31). Introduce the part in the slot and press it with the roller.

(32, 33). We repeat the process using a smaller diameter slot until we get the final size.



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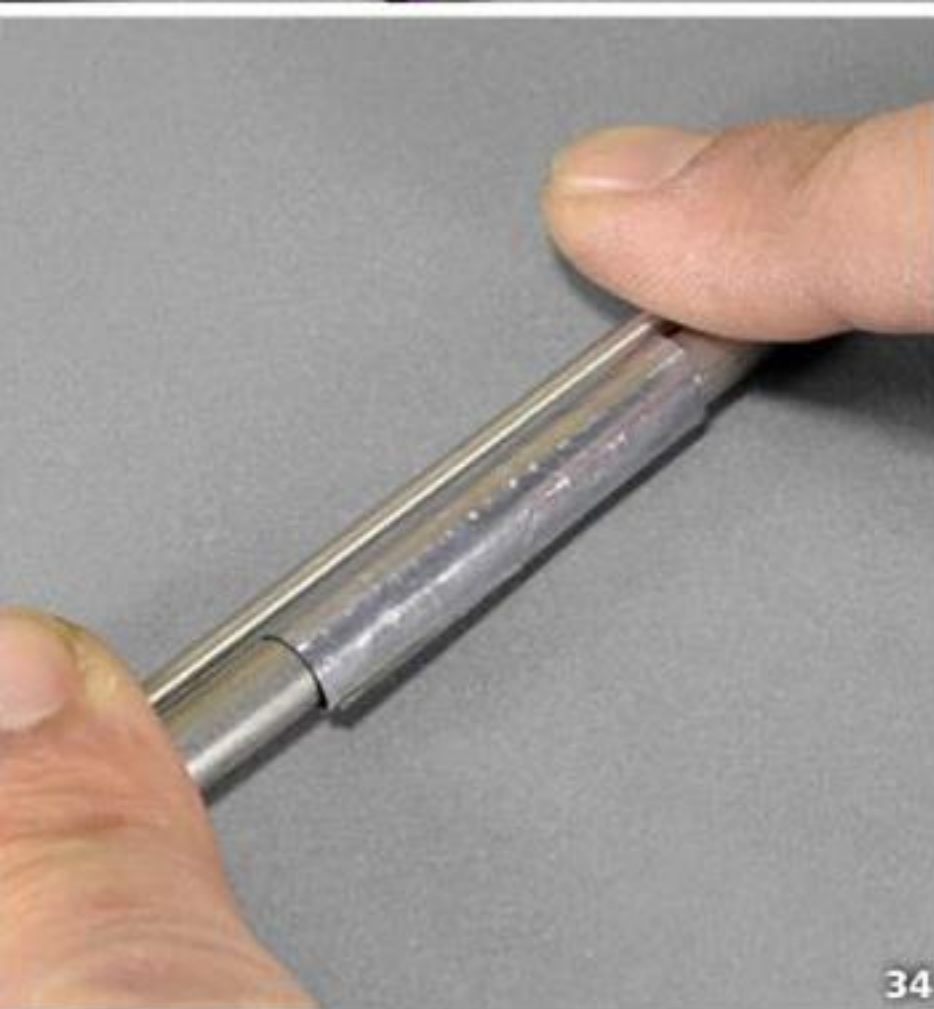
(34). We use two rollers to close the edges. Pressing and rotating the part between them on a smooth and hard surface we finally obtain the appropriate shape.

(35). Detail of the finished part.

(36). Here you see another great tool that helps us to create handles. The tool is calibrated which means it allows us to obtain the right size handles and to create as many exact copies as we need.

(37). To create an improved handle we introduce a metal rod between the two halves of the tool, firmly holding it. We close the tool.

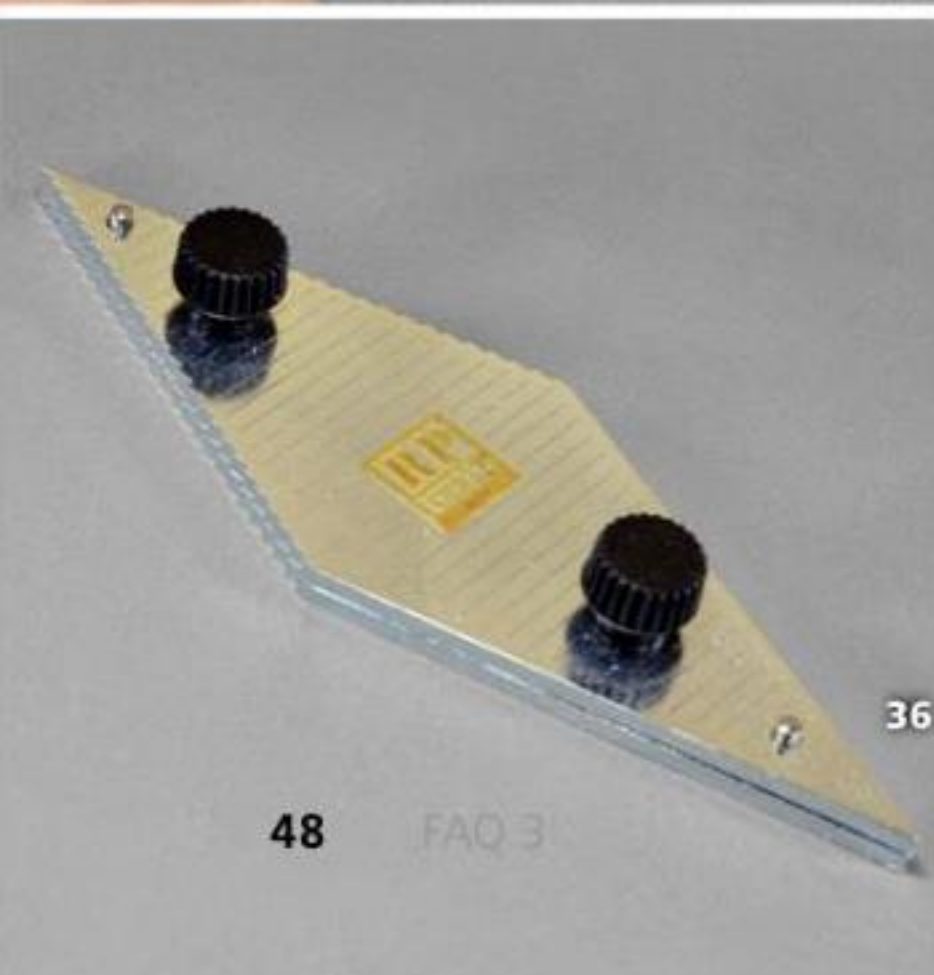
(38). We use a metal ruler to press the rod so it perfectly bends at the right angle.



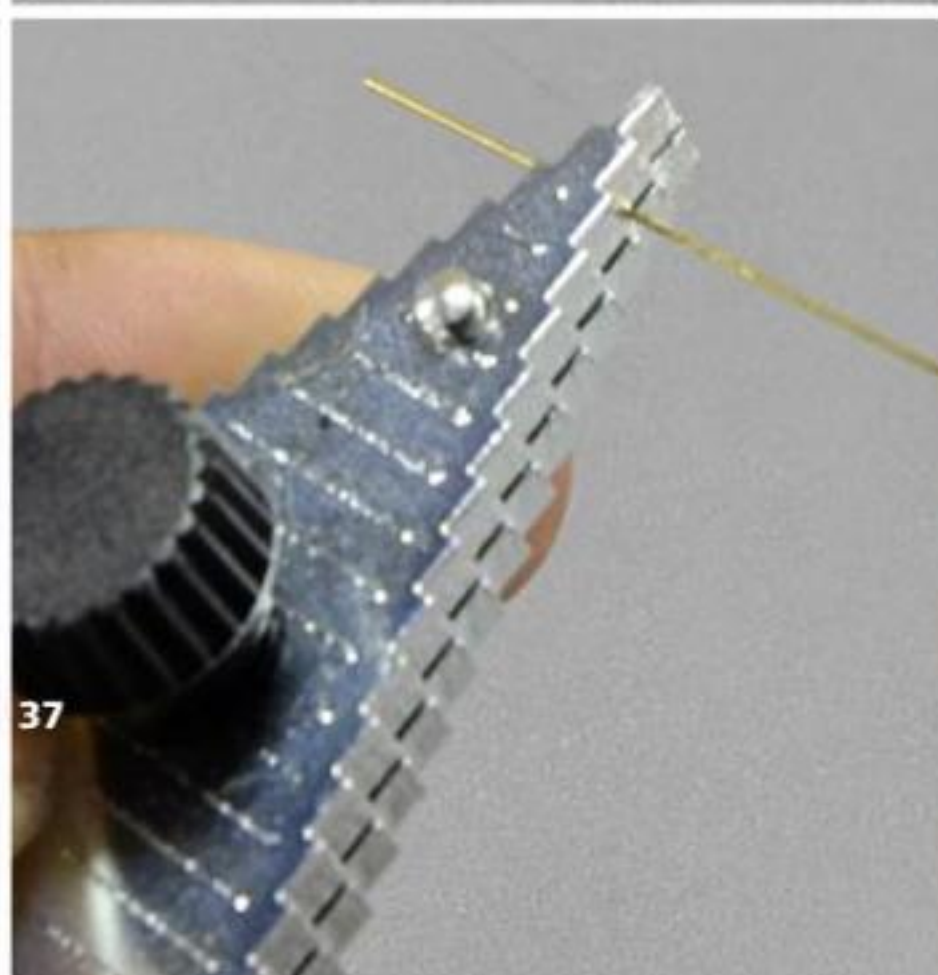
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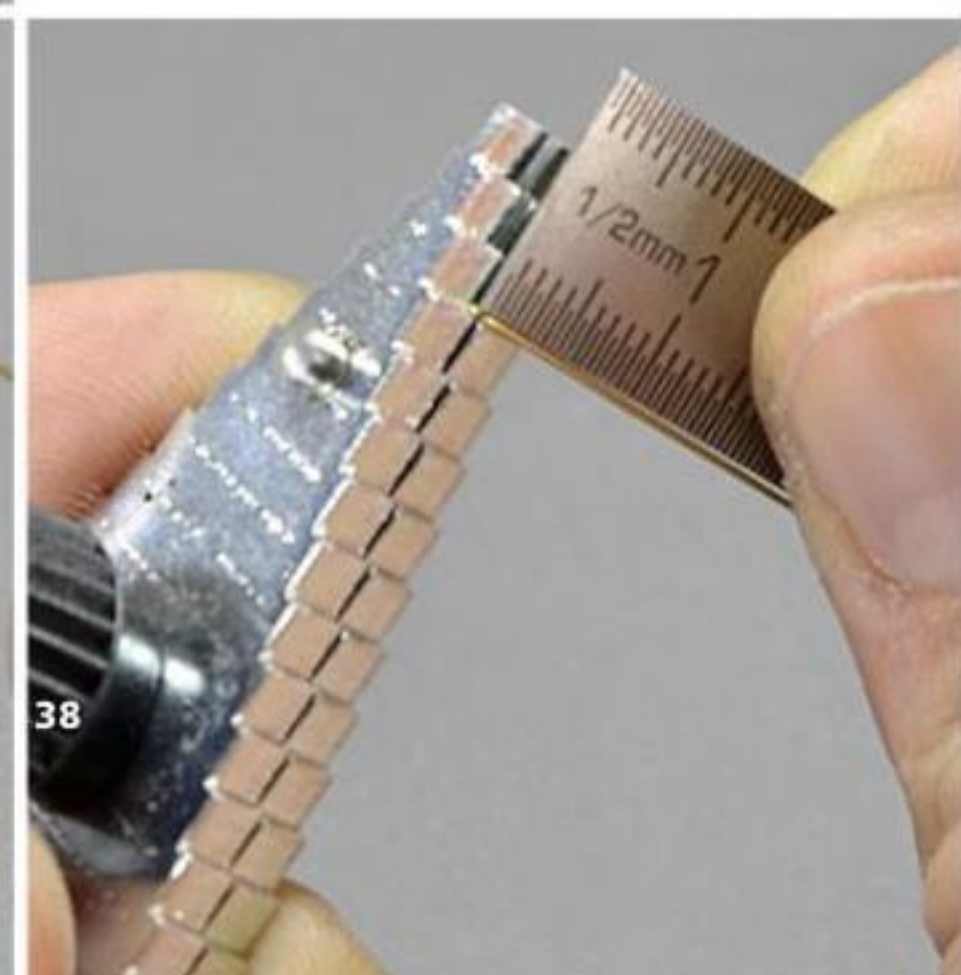
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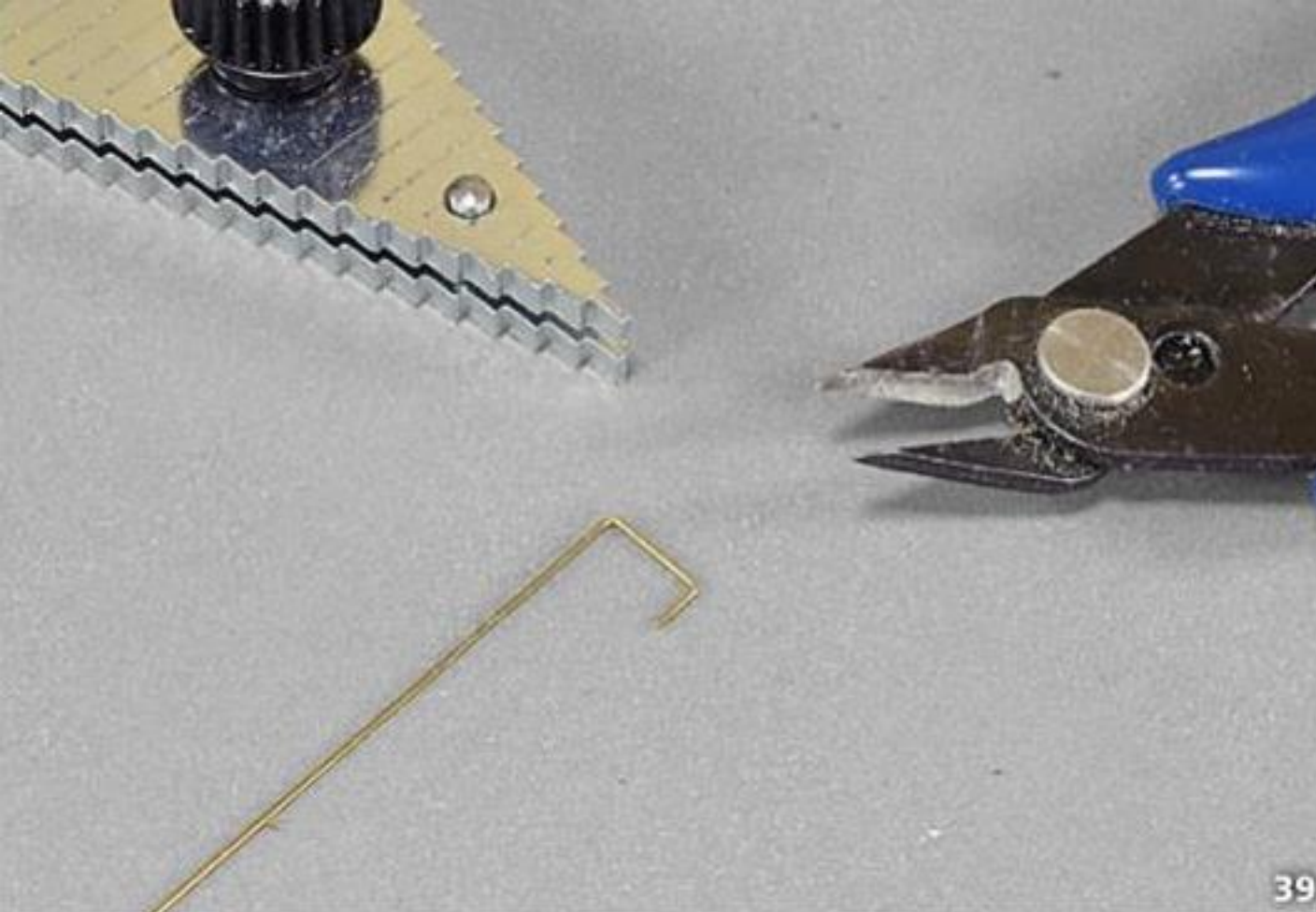
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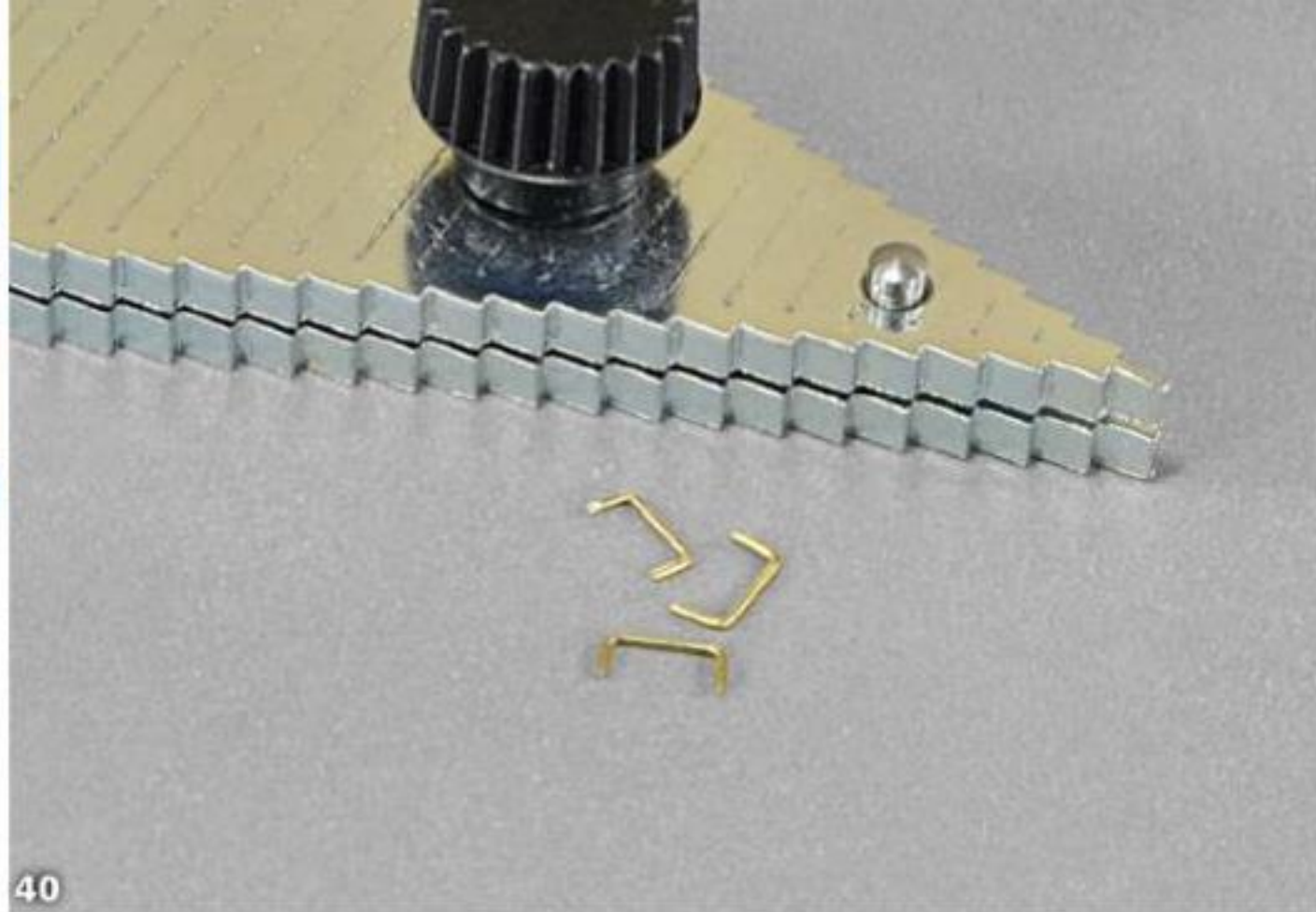
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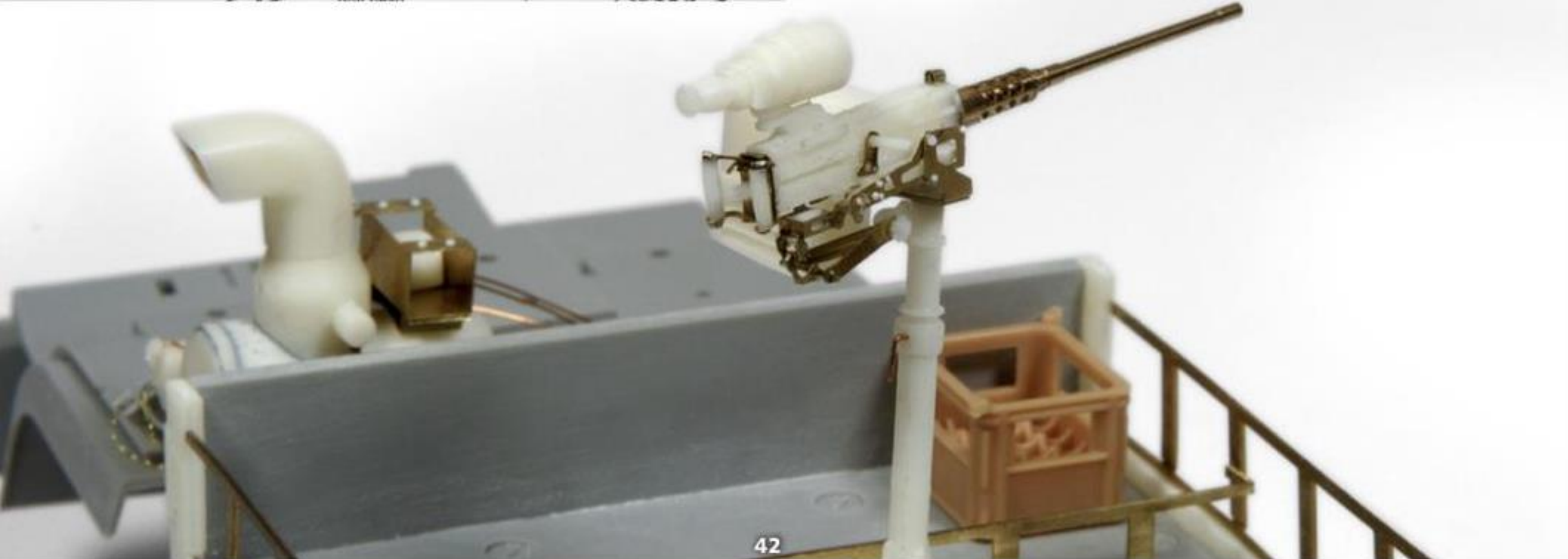
(39). Finally cut the rod with some cutting pliers.

(40). Detail of the handles, cut and finished.

(41). The superdetailing of some parts involves materials such as own photo-etch, metal parts and resin parts.

(42). This 50 caliber Browning in resin includes PE details for the bracket and a metal barrel.

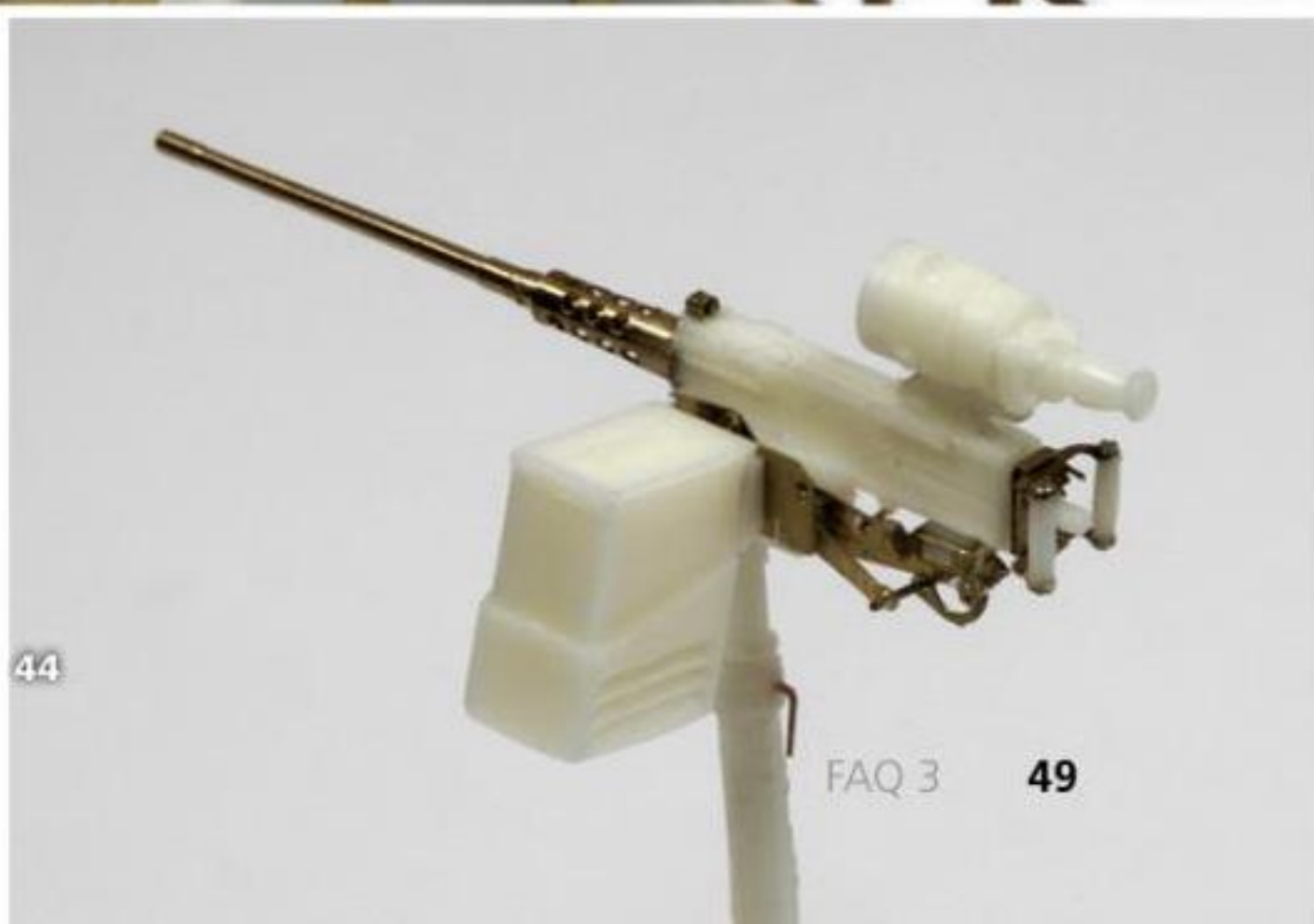
(43-44). These kinds of high-quality parts add a lot of value to our models.



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Spanish Centaur from Trumpeter. You notice how the improvements have changed the look dramatically, increasing its complexity and making it a much more realistic model. Among these improvements are a couple of photo-etch sets, ET Models resin wheels, the L/52 105mm gun and some antenna bases from RB Model.





This BTR 80-APC from Trumpeter is superbly detailed with a Voyager Model set and resin wheels from E.T. Models.



II.1.4. SOLDERING

The problem with photo-etch is how to fix the parts. This can be done with superglue (cyanoacrylate) or two-component adhesive. The alternative is to attach metal parts to each other by soldering. Although this technique is not always simple and requires some practice, it produces excellent results and very durable joints.

Next we will see how to prepare and solder different types of metal, as well as the obtained results when detailing a model.

Tools

(1). The basic materials needed to start soldering are presented in this picture, from right to left:

A pencil-type **soldering iron**, in this case one of 11w is shown. Its heating is constant and it has a high thermal inertia. Both at the time of welding and during pauses, the soldering iron remains connected to the electric power. This is useful when it comes to soldering photo-etch parts since this is a job that demands repetition and time.

Fine brush to correctly apply the paste or thermal fluid.

Flux, paste or thermal fluid that is used in tin solders to substantially improve its adhesion. To get a correct and accurate application you must use a rather fine brush. It comes in two forms: paste or liquid. Modelers usually use the latter since its application is easier for soldering photo-etch.

Wire or tin wire, although in reality it is an alloy of this metal with lead, usually in a proportion of 60% to 40%, which is much more convenient for this type of work. To ensure good adhesion, much better than the one obtained using cyanoacrylate it is necessary to



reach a certain temperature both in the tin and the element to be soldered. If this temperature is not high enough we cannot guarantee the good adhesion of the parts. The melting temperature is usually between 200 at 400° C.

Metal tweezers, to correctly handle the parts to be soldered.

Different types of sandpaper and files to properly clean the surfaces that are going to be soldered. They are also useful to eliminate tin remains once the parts are soldered.

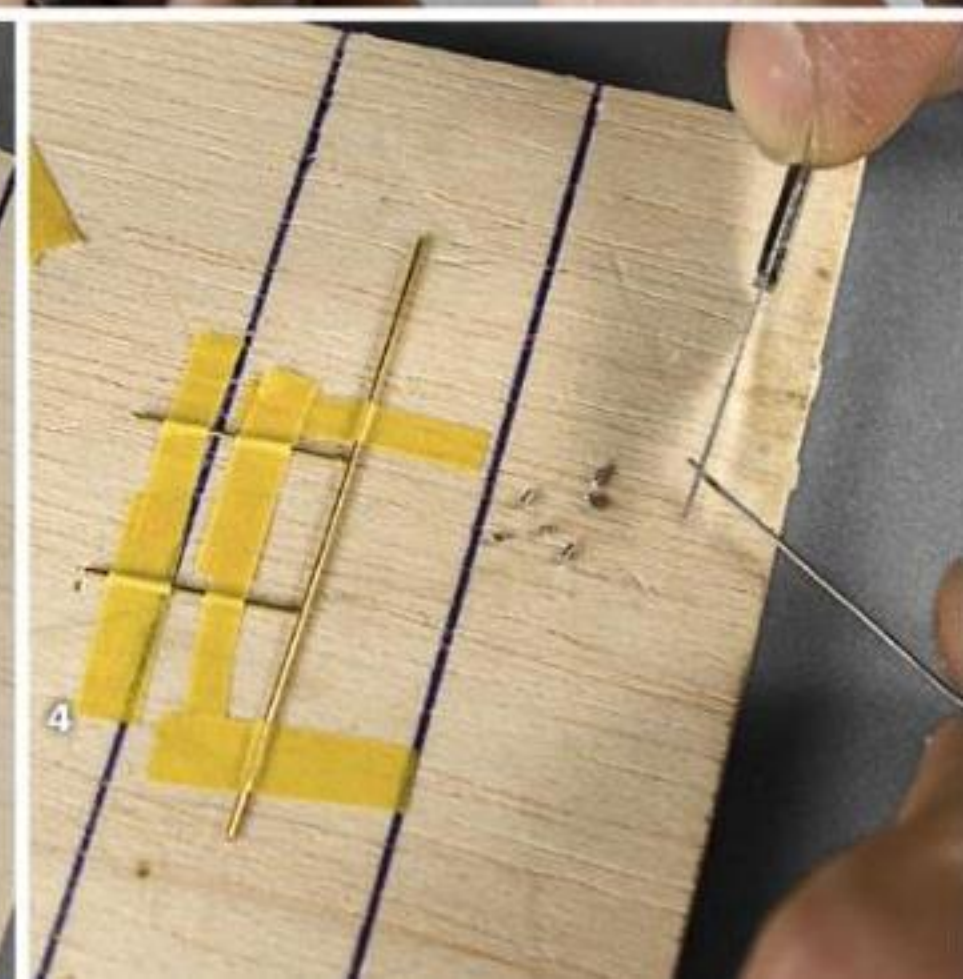
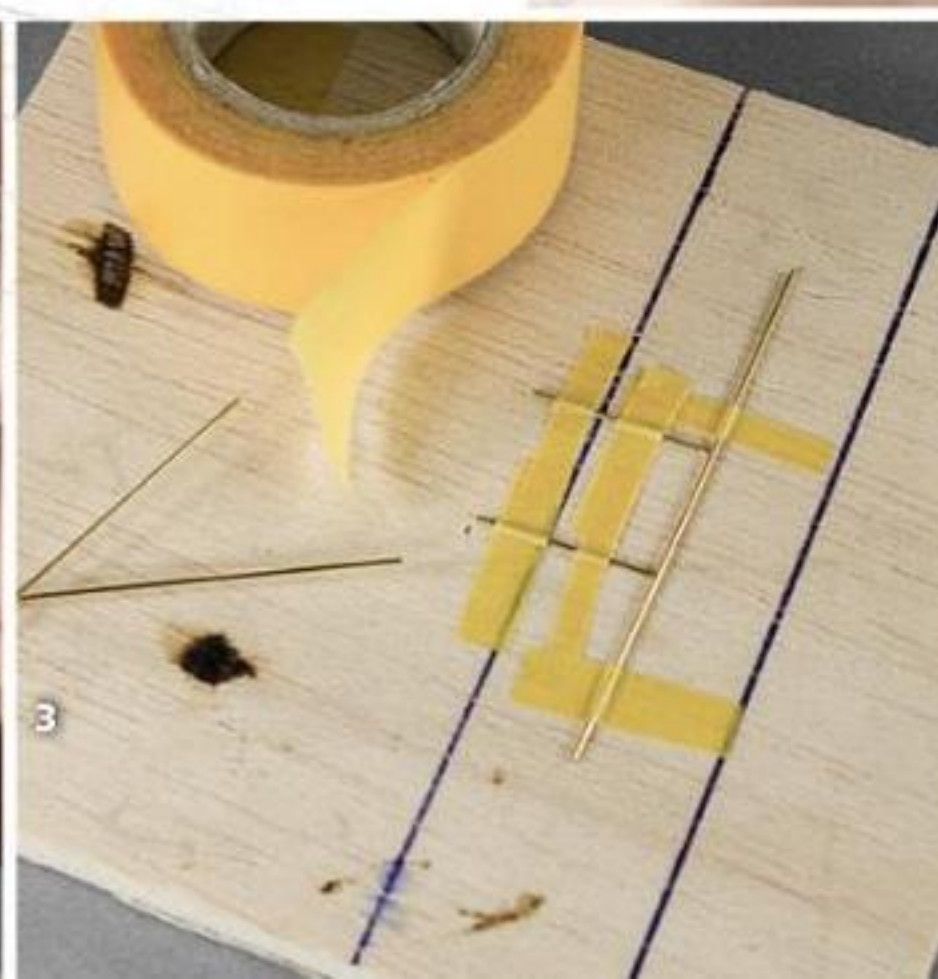
Brass rods of various diameter that are useful to perform all kinds of grids, brackets, etc., or even to replace flat photo-etched parts with round ones.

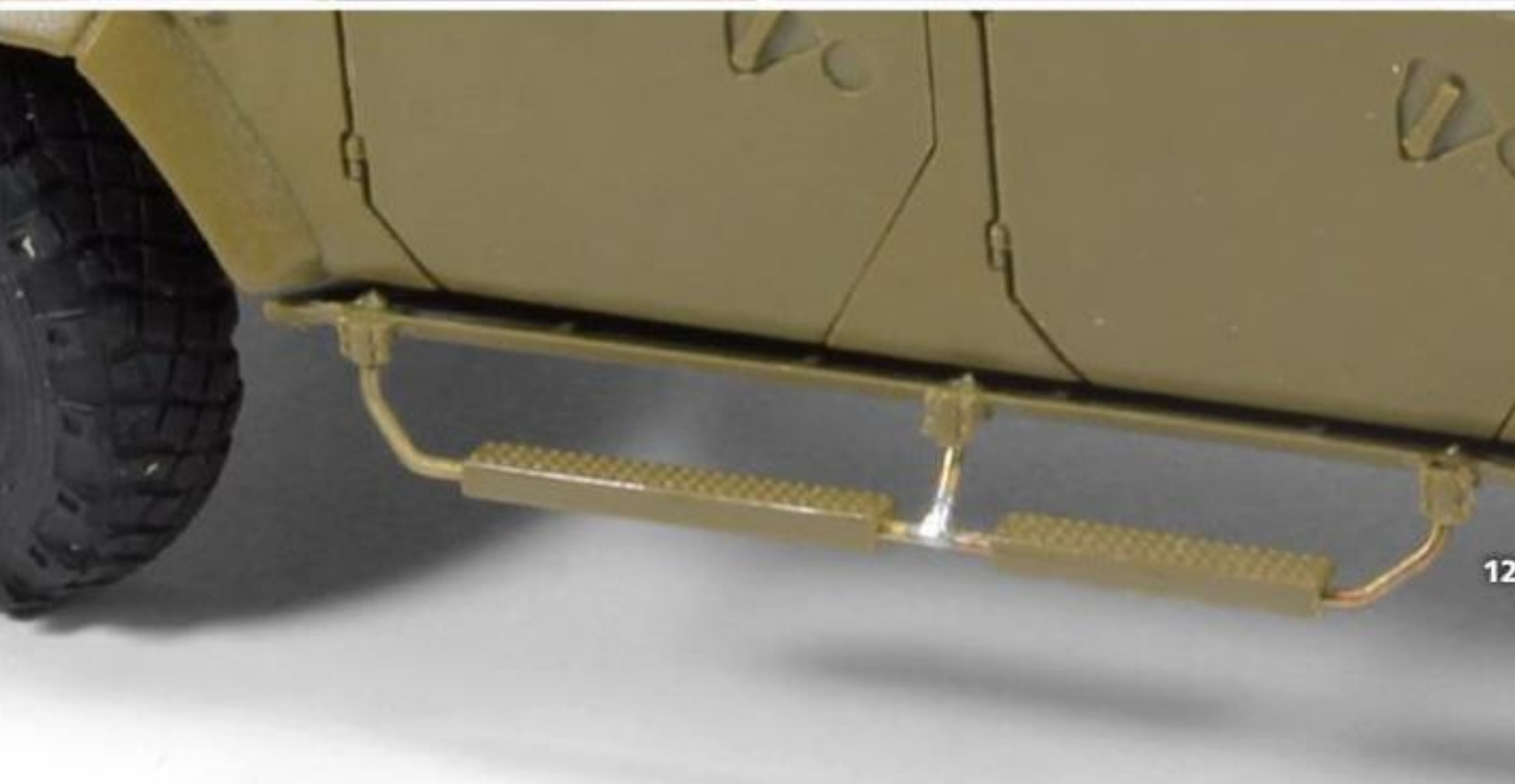
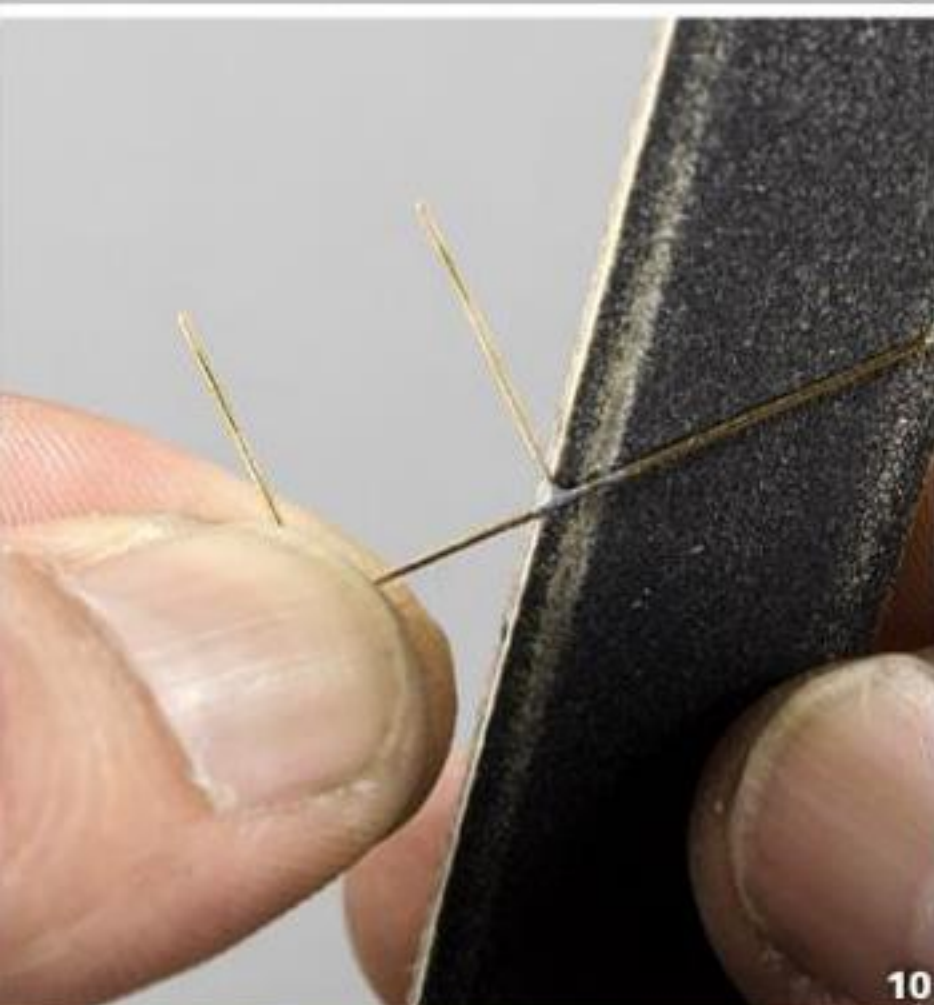
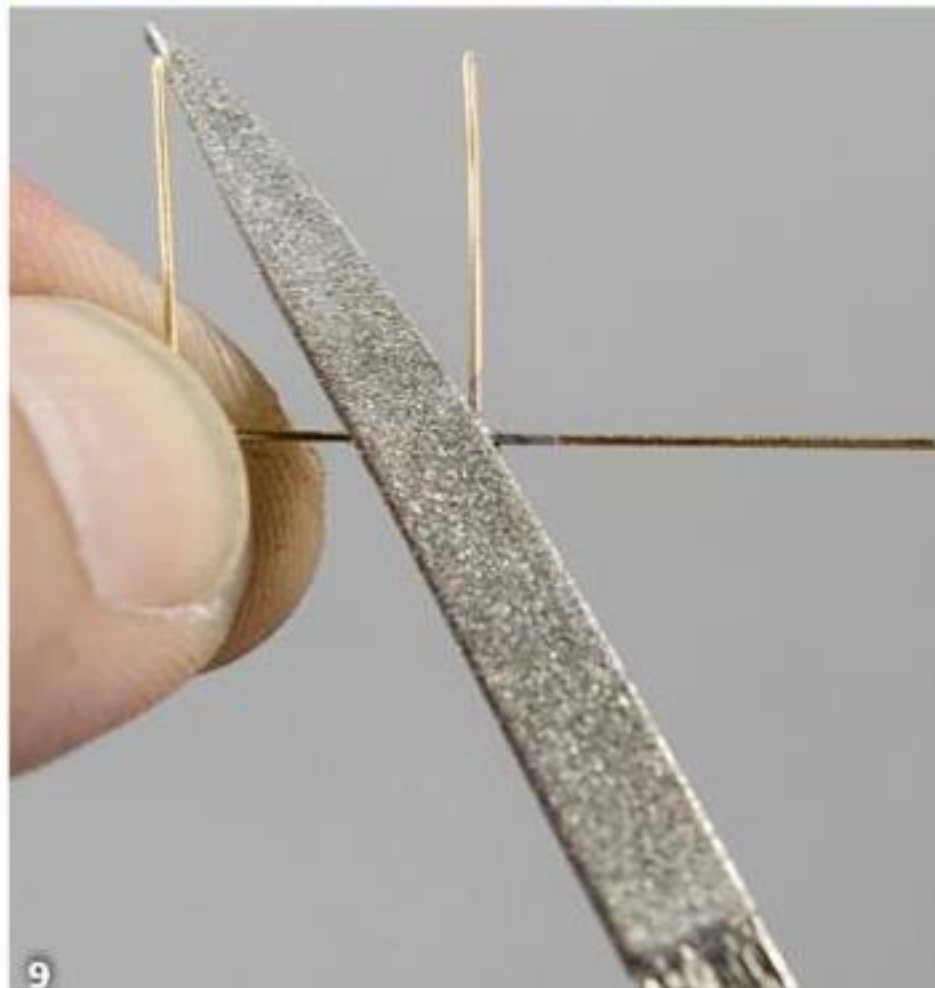
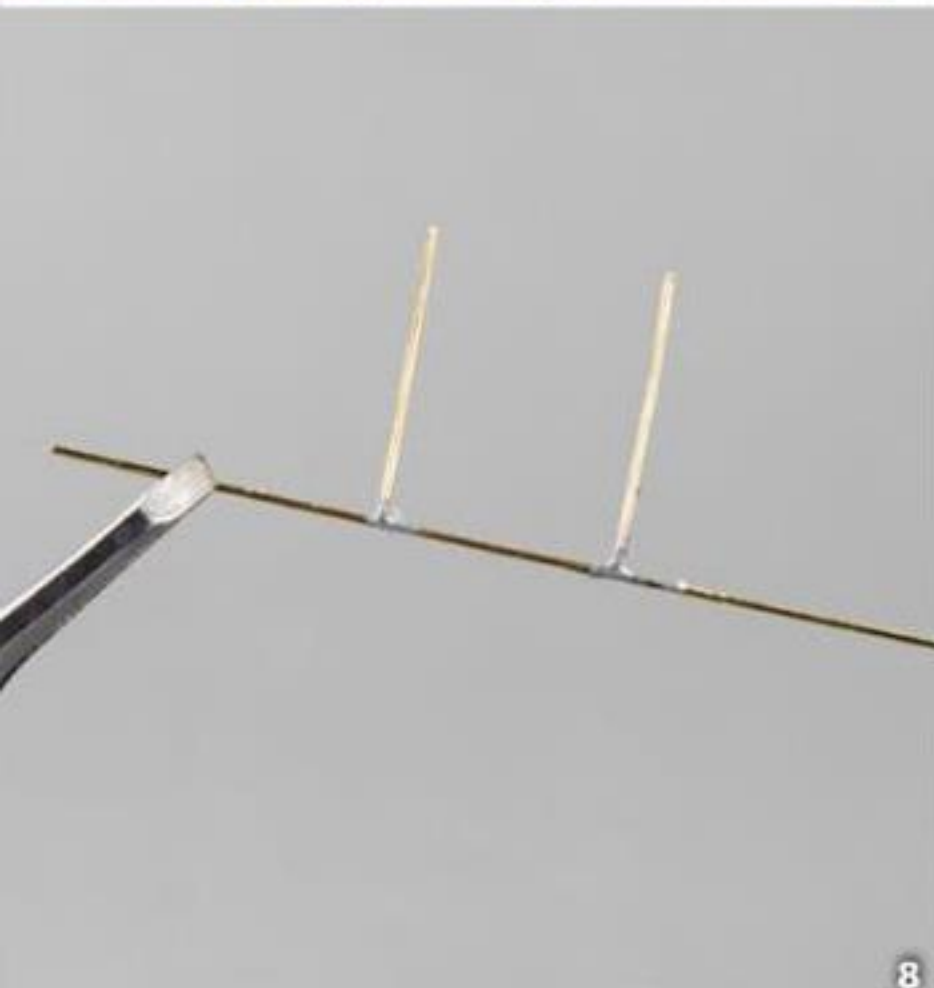
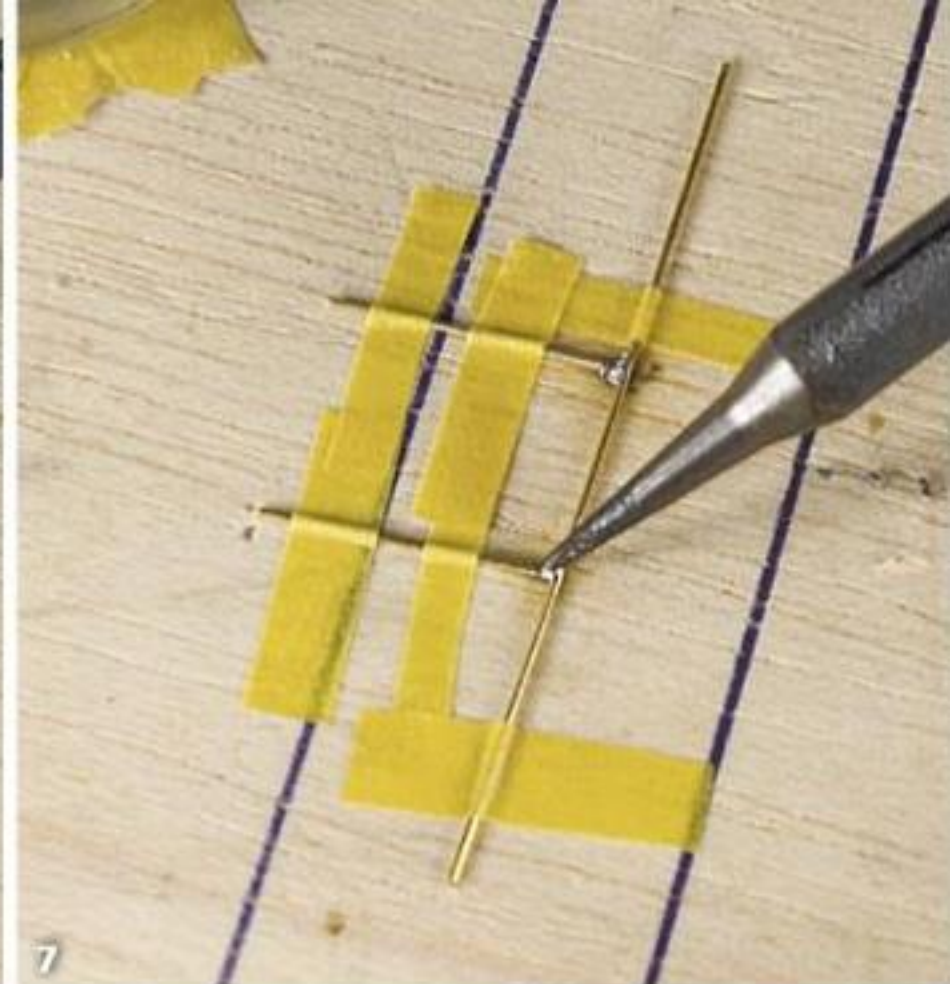
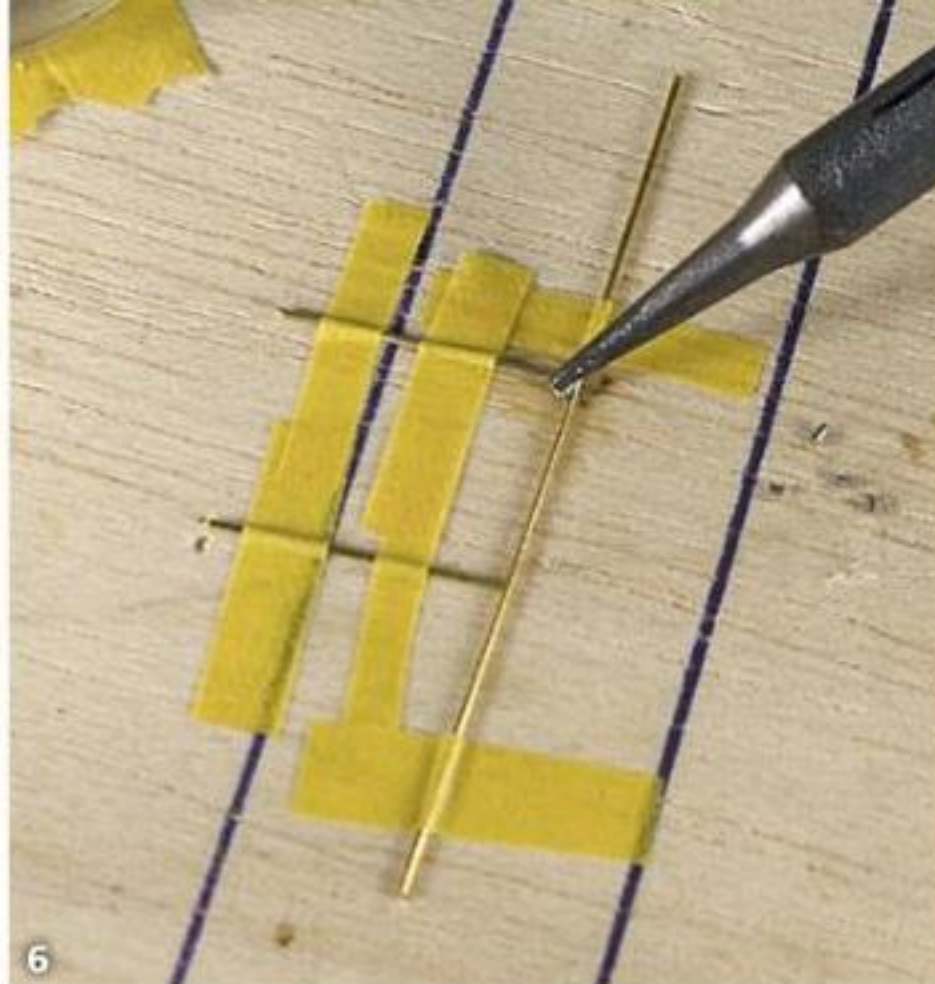
Soldering metal rods

In this example we will see how to prepare and solder brass rods in a way to make baskets, grids and supports of all kinds.

(1). To begin with, using a medium grain sandpaper we remove all the imperfections as a result of cutting the rods.

(2). Then with a soft sandpaper all dirt and stains are removed. We basically smooth the area to be soldered so everything will get a better grip.





(3). One of the most important steps is the fastening of the parts. We use a piece of wood so as not to burn our workbench during soldering. With masking tape we fix all the parts by placing them correctly and in their final position.

(4). We cut small pieces of tin.

(5). Apply the flux with a brush over the areas to be soldered.

(6,7). Next, with the tip of the soldering iron we pick up one of the pieces of tin. It will quickly melt due to the heat and it will be stuck to the tip of the iron so we can place it on any of the joints of the parts to be soldered. By applying heat with the soldering iron, and due to the flux that was previously applied, the tin will "run" along the gaps between the parts, leaving these perfectly soldered. If we need to make corrections it will be enough to apply heat again with the soldering iron so the welded parts will be released.

(8). In this picture you can see the soldered rods and the excess of tin in the connection points that we will have to remove.

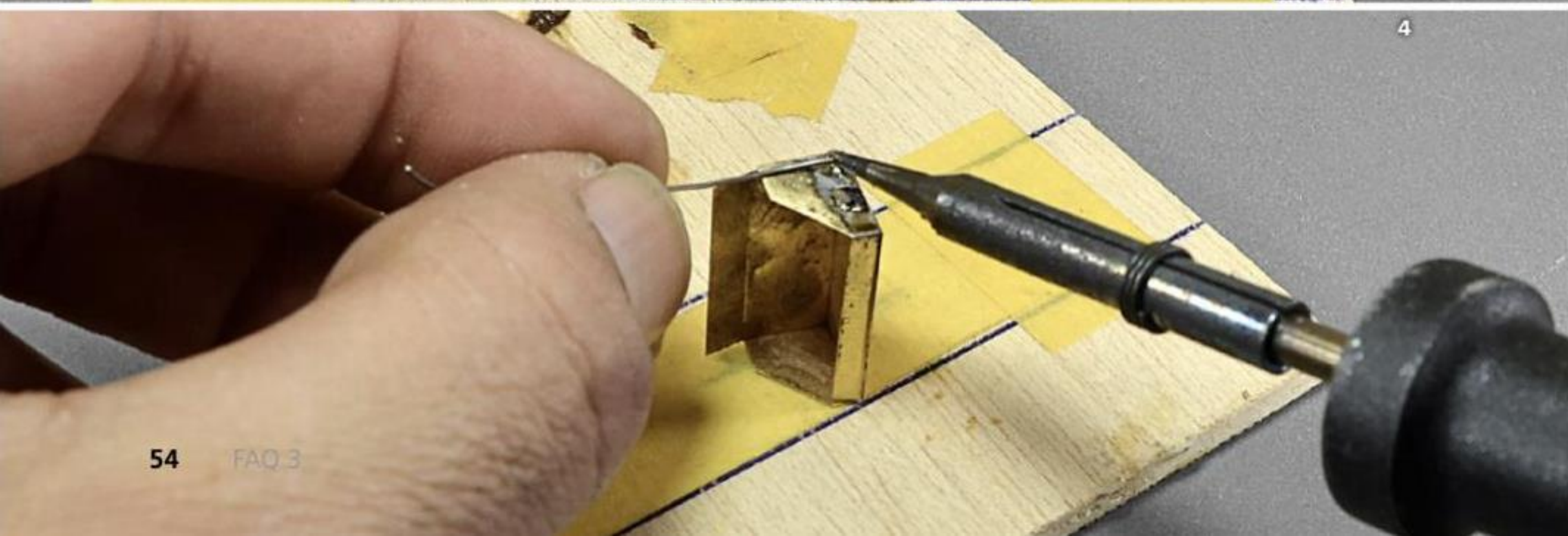
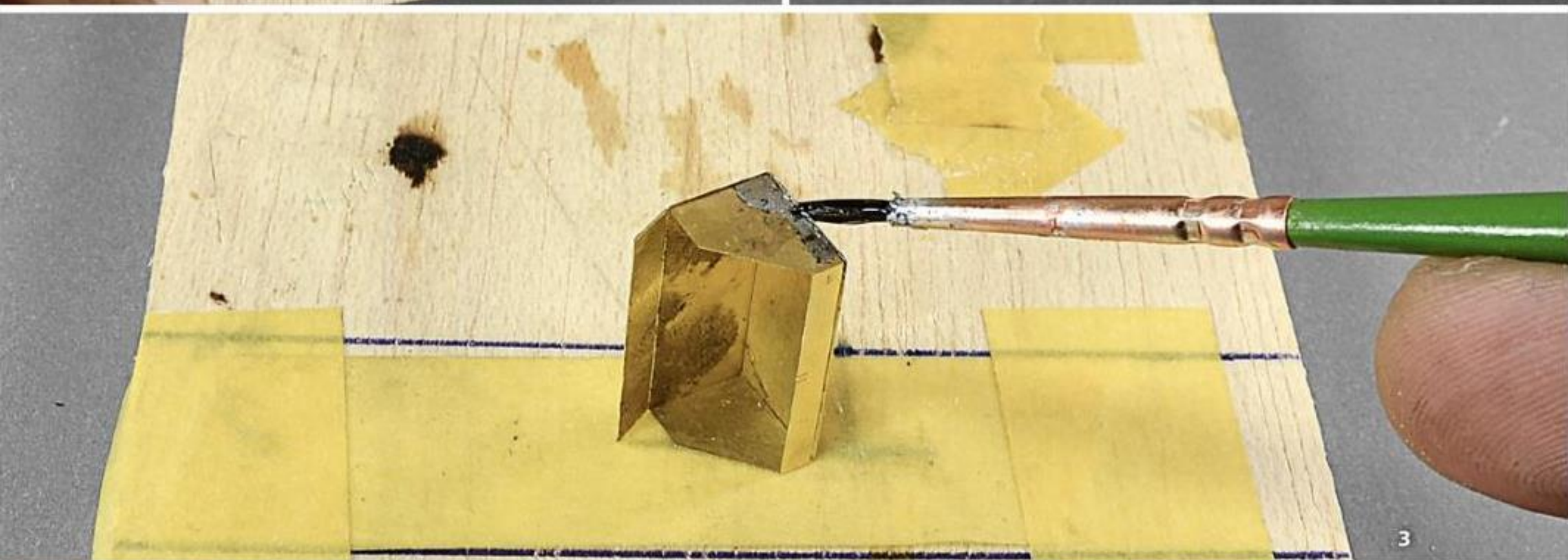
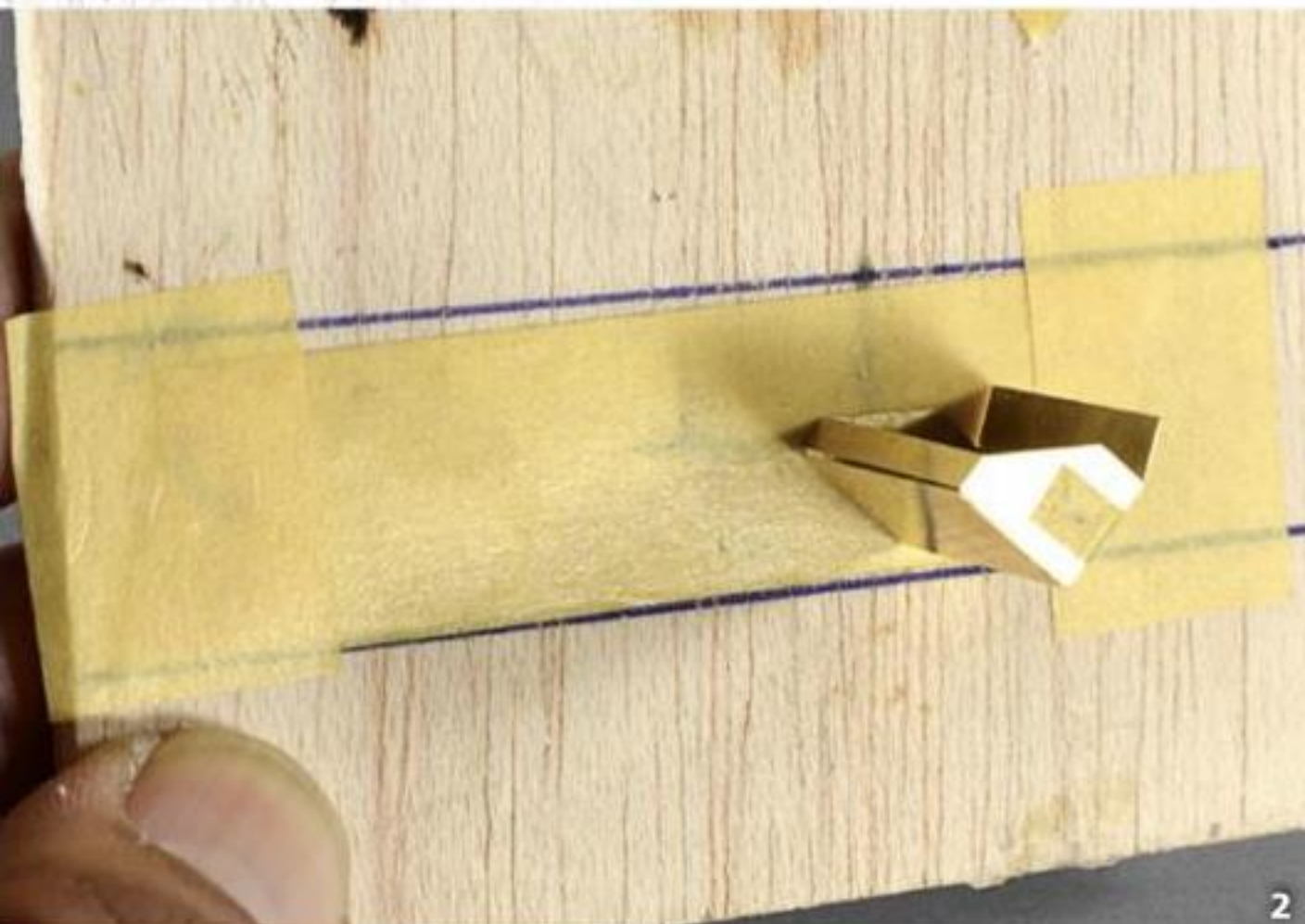
(9). To eliminate this excess we use a metal file. Tin is soft and can easily be removed.

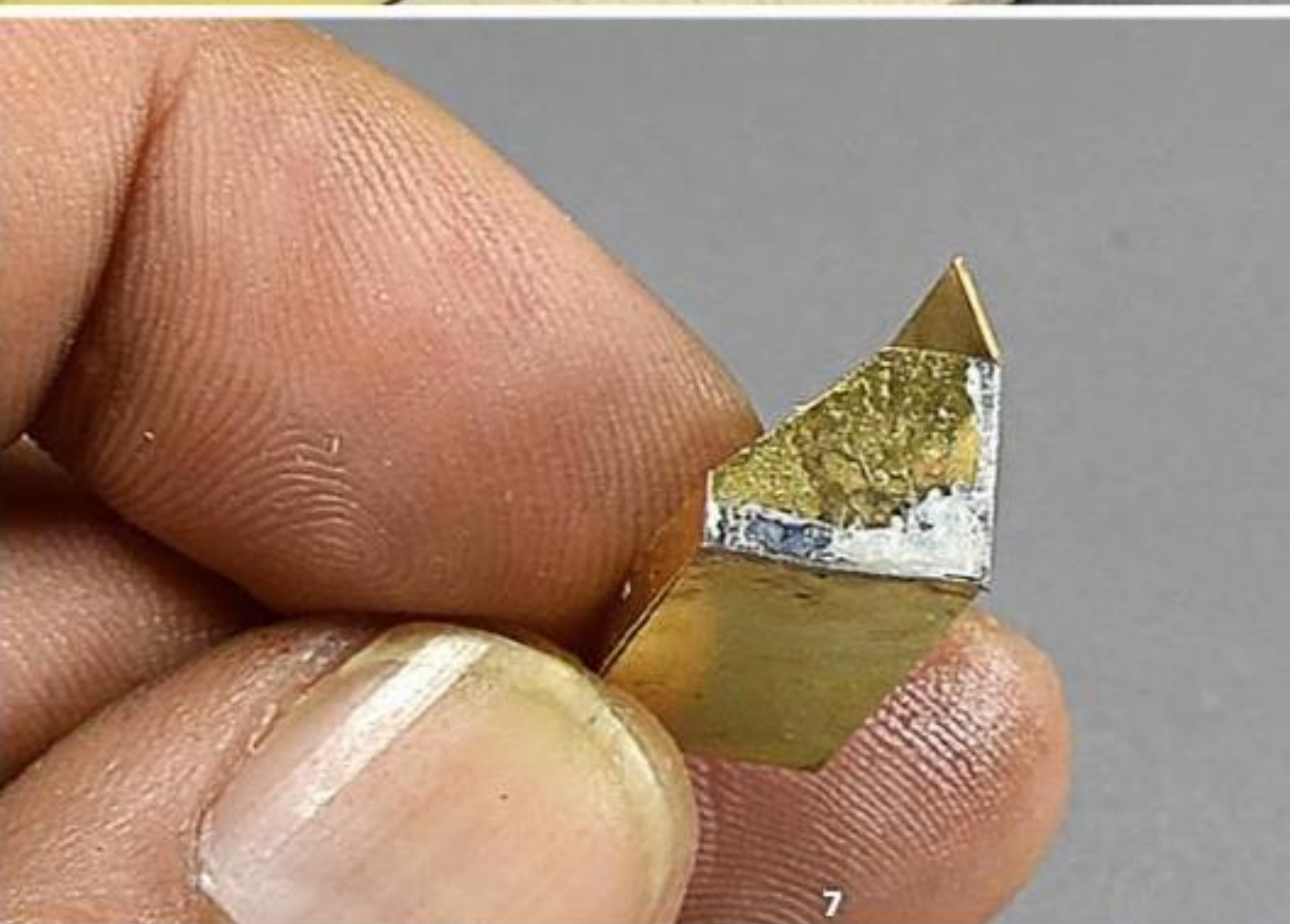
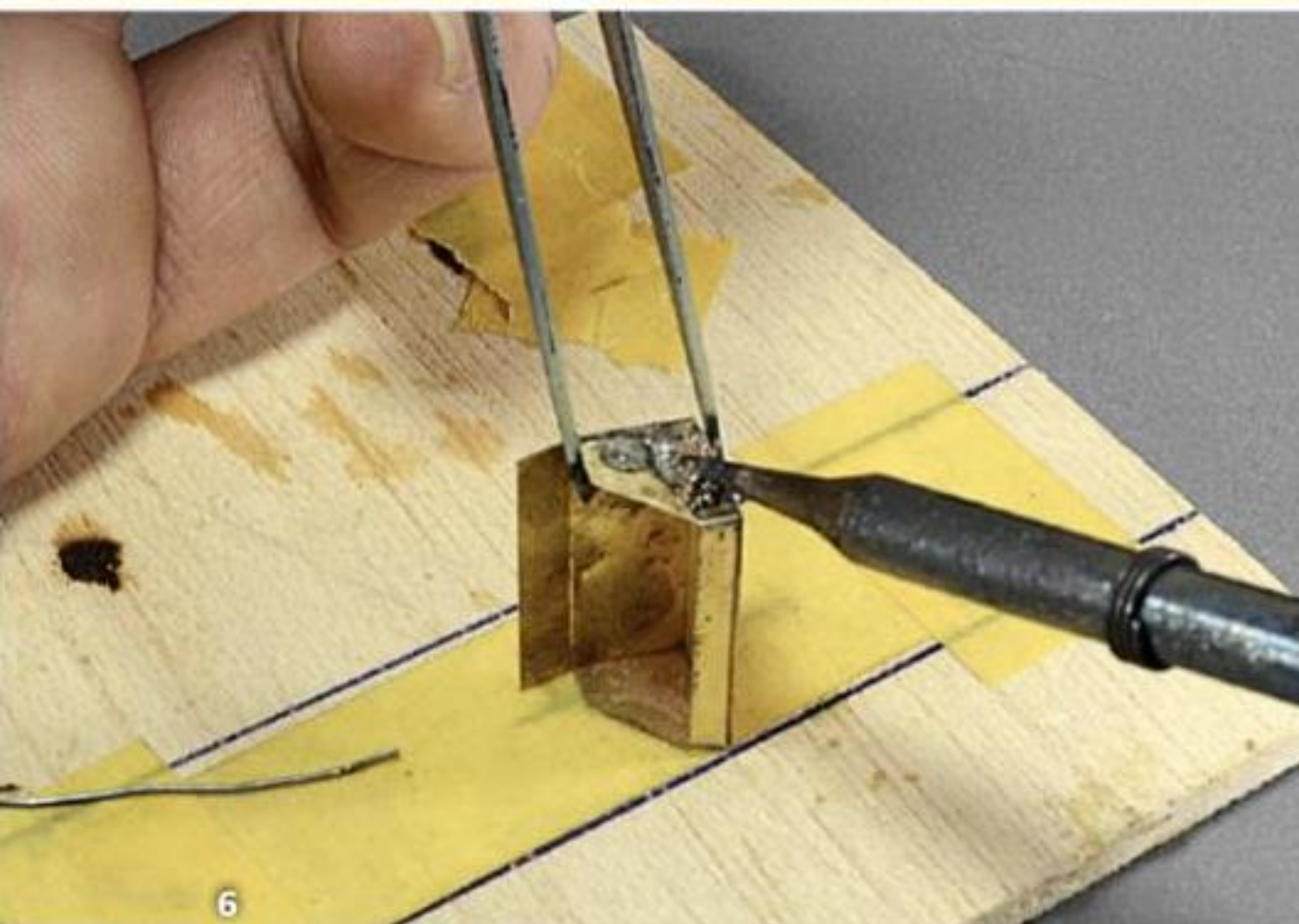
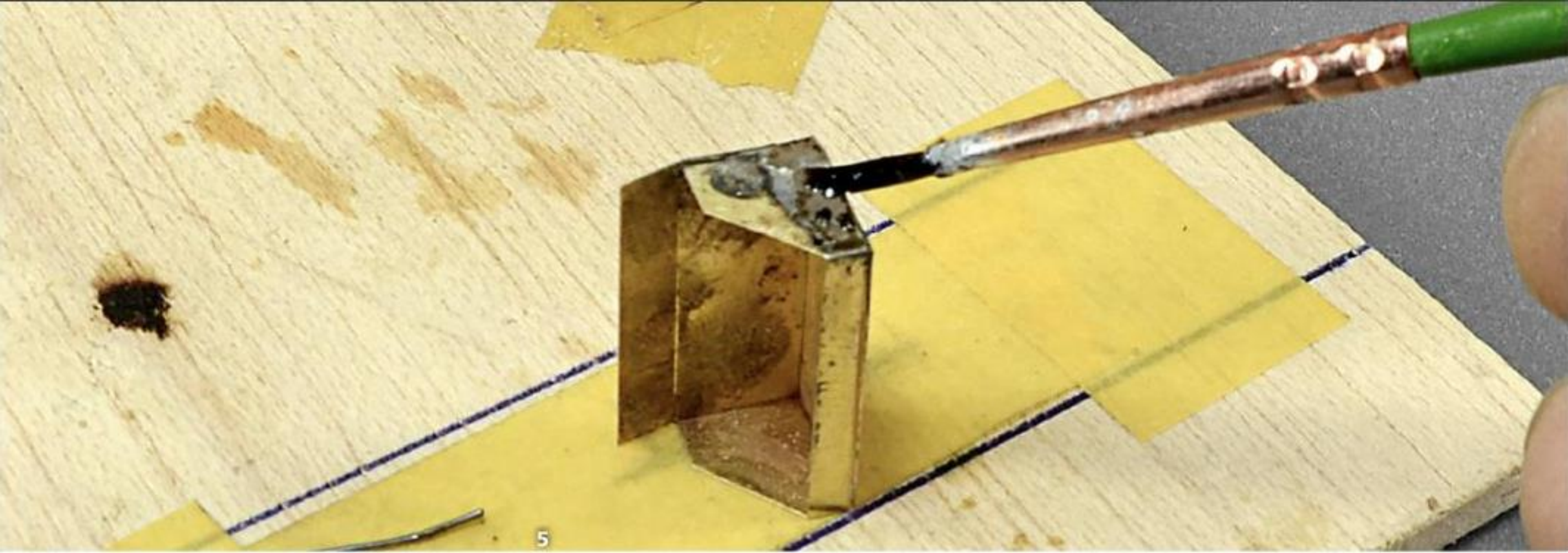
(10). We can touch up with more soft files until we get the desired finish.

(11,12). Detail of the finished part. Observe that the connection points are completely clean. The advantage of soldering is the strong and durable fix between the soldered parts despite being rods of small diameter.

Soldering photo-etch

(1). Usually the photo-etched metal parts are flat. A trick to hold them in place is to use the masking tape upside down, with the adhesive facing up. We can fix the tape to the working surface with two other pieces of tape.





(2). This will allow us to firmly hold the parts when soldering.

(3). In this case we are going to solder pre-tinned parts. Prior to soldering we apply tin to the contact surfaces of the parts to be soldered. As with the rods we have to apply flux to these areas.

(4). First, we heat the part with the soldering iron. Next we touch the tin that will be adhering to it thanks to the flux forming a thin layer. It is important that this layer covers the whole contact surface.

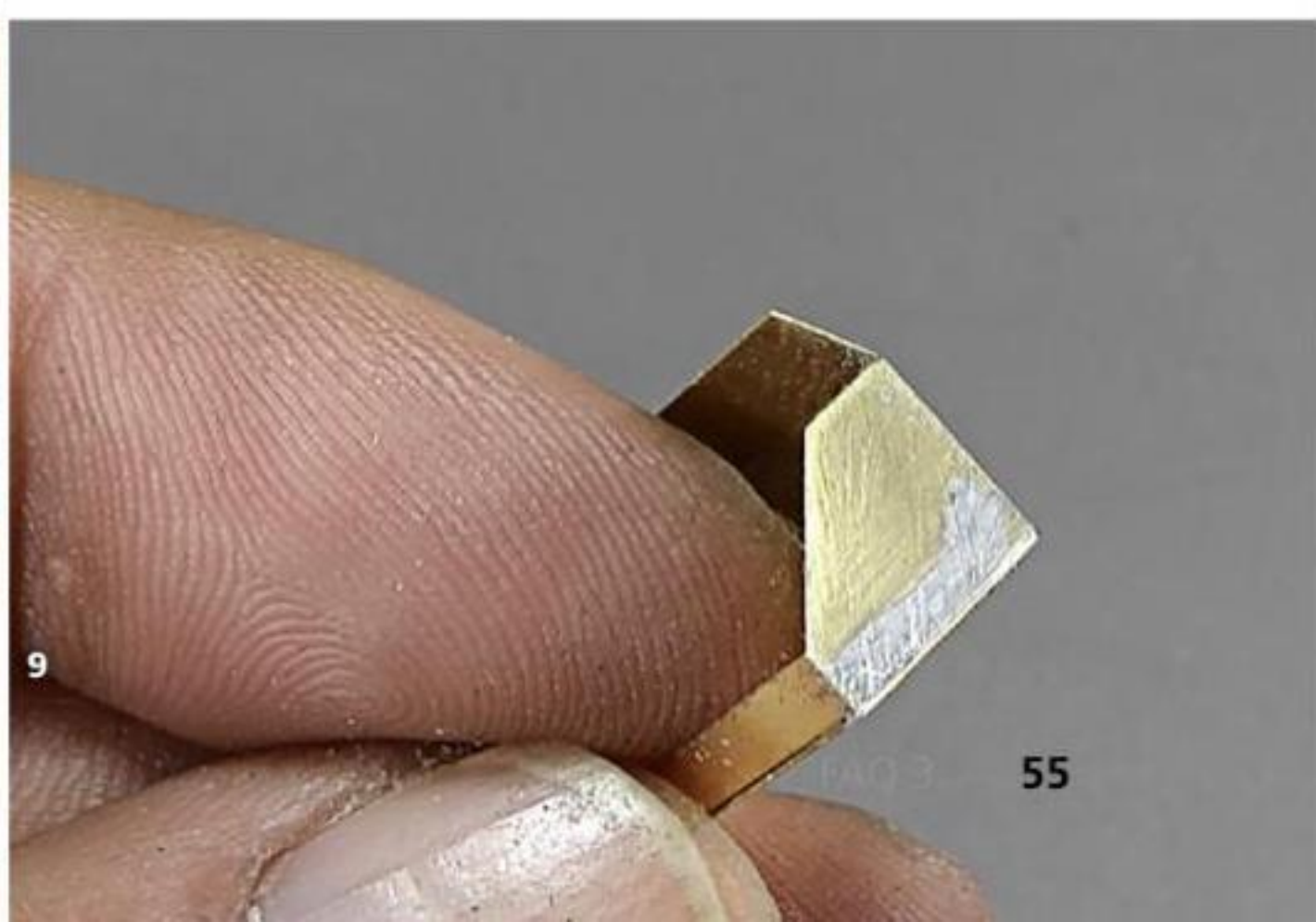
(5). We apply flux again on the area to be soldered.

(6). By having the area covered with tin we can dispose of both hands, one to hold the part and another to apply heat with the soldering iron. We hold the soldering iron until the tin is melted and solders the part.

(7). Detail of the finished, soldered part.

(8). As in the previous case, the imperfections of the weld are removed with sandpaper and files.

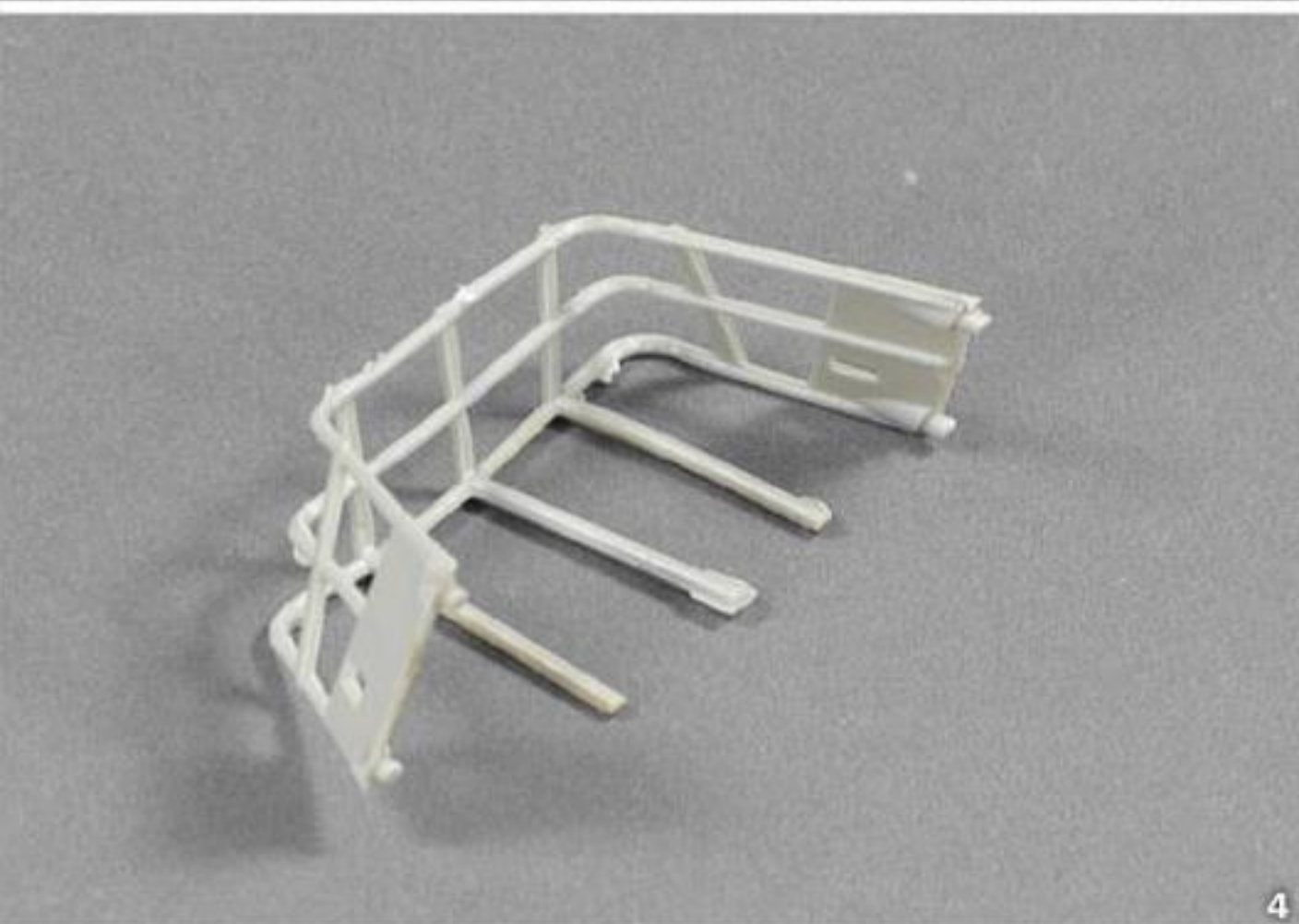
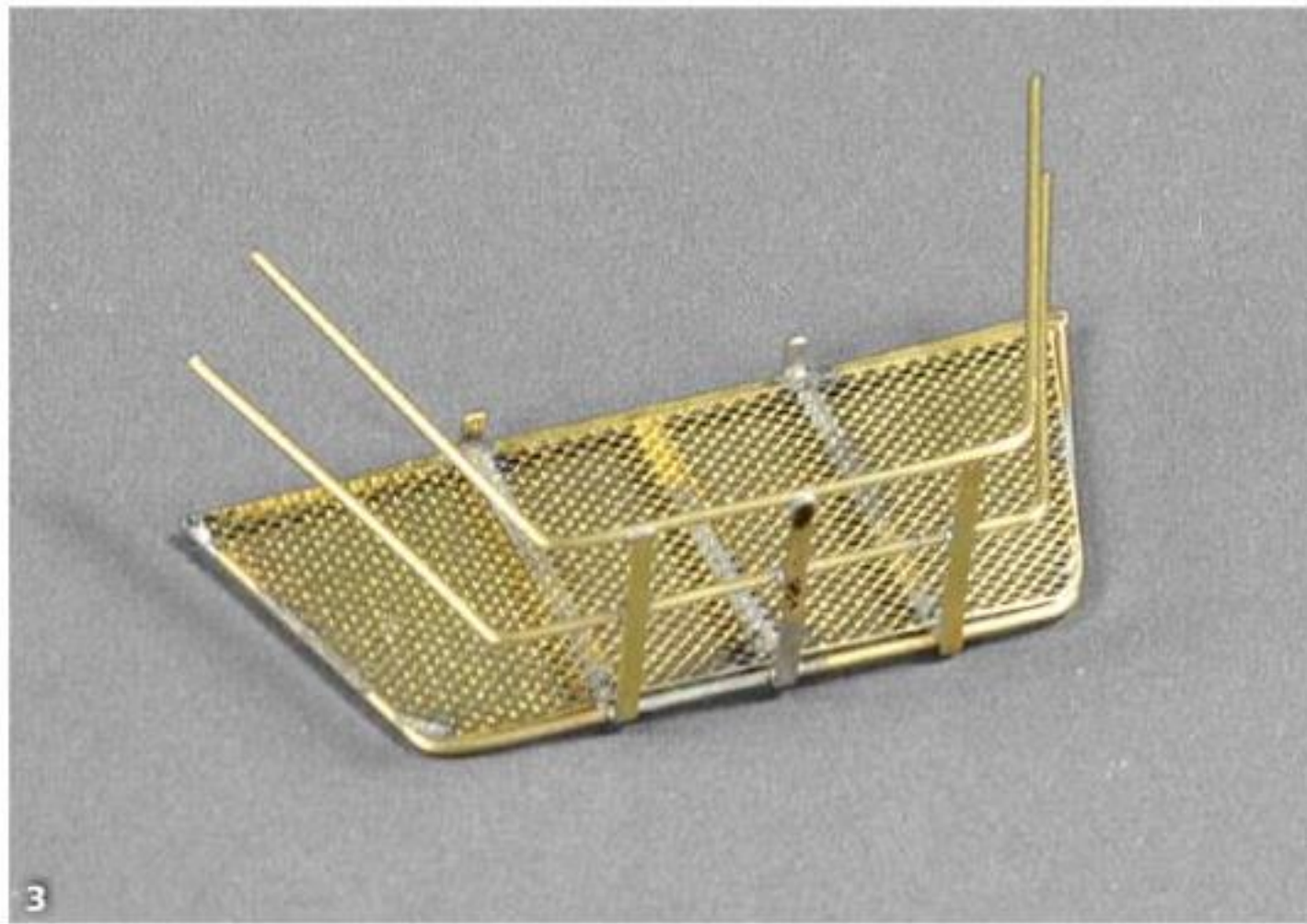
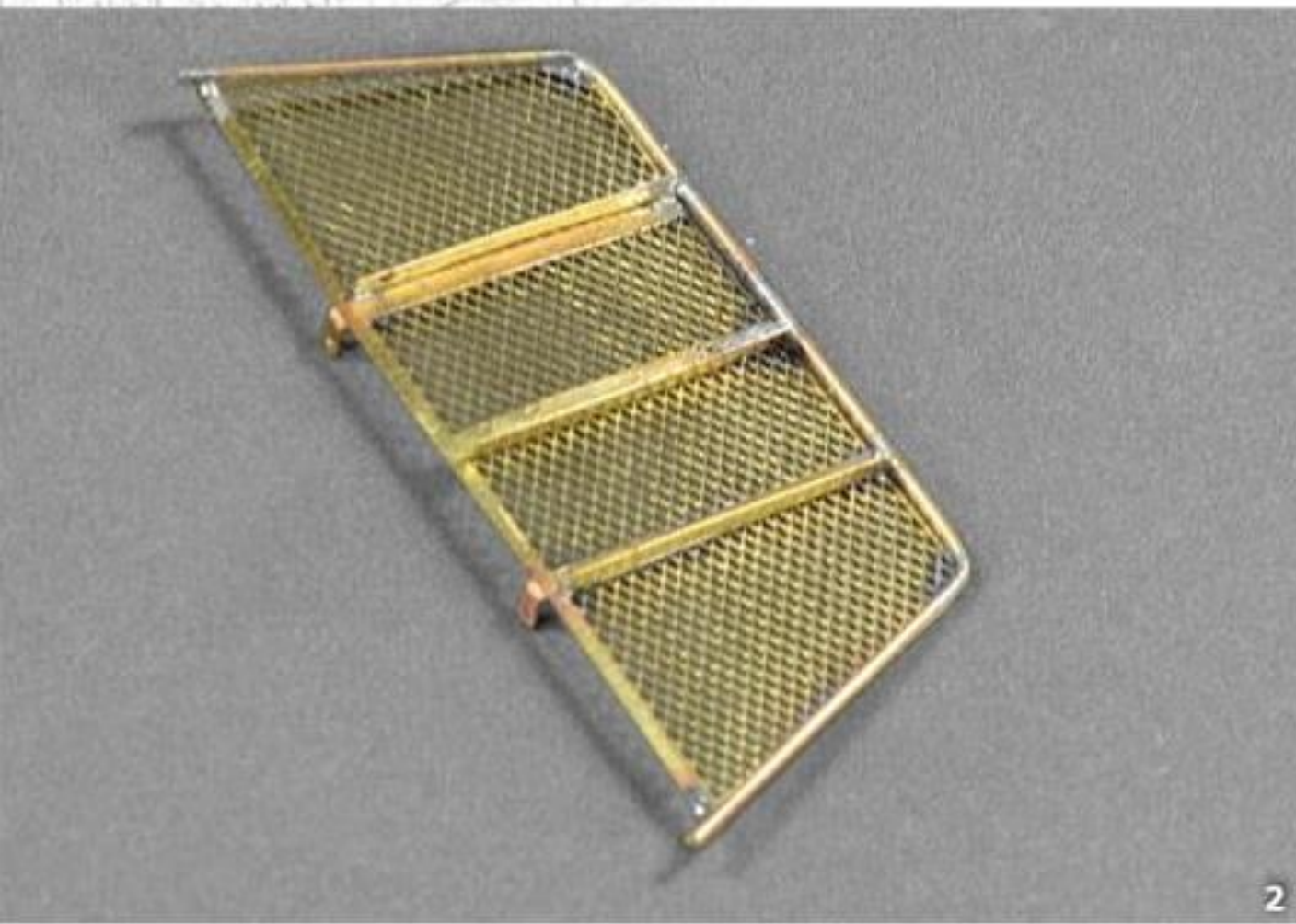
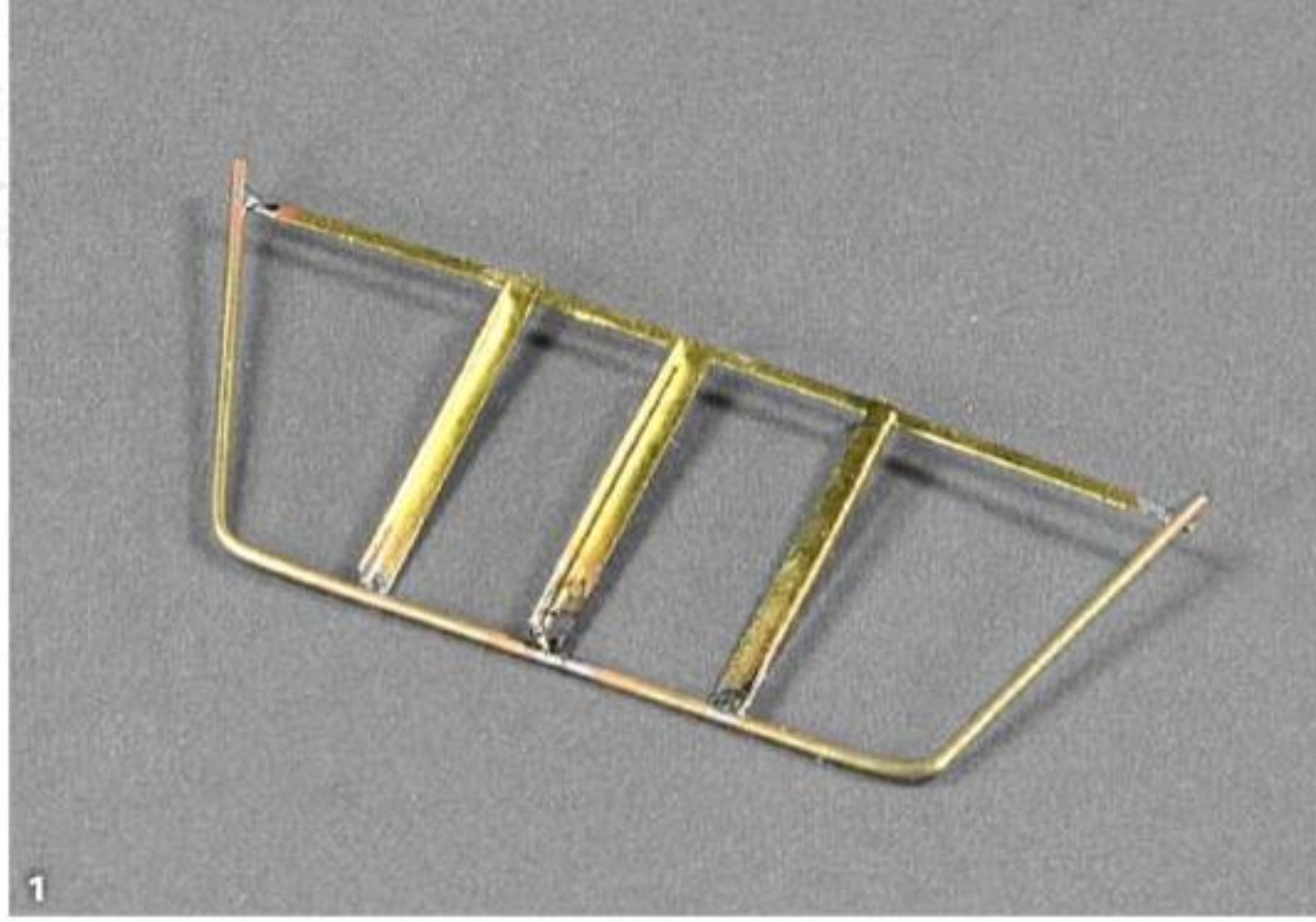
(9). Detail of the weld, perfectly sanded and without imperfections.



Mixed technique

(1). In this example we are going to make a basket soldering rods and photo-etch parts. In the picture you can see how we have soldered the frame to the flat photo-etch reinforcements, following the method we previously covered.

(2). Next, the joints are filed and the photo-etch webbing is added.



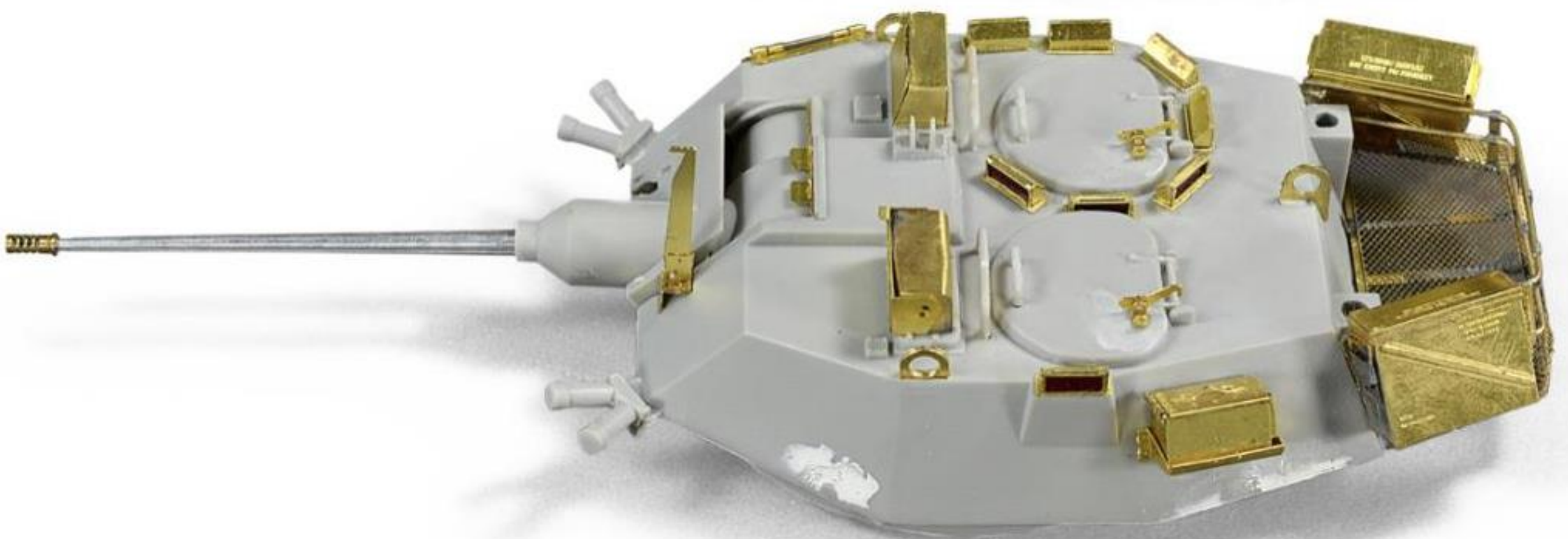
(3). After placing and soldering the vertical brackets we solder the rods of the basket.

(4,5). Observe the difference between the original part and the soldered basket.

(6). Once the part is finished it is necessary to do some dry fitting on the model.



The turret of this Trumpeter LAV- 25 has been seriously detailed with photo-etched parts soldered using the techniques we have described.



II.1.5.

MODIFYING THE SUSPENSION SYSTEM

When our idea is to build a small vignette or diorama, or when we simply want to show our finished model on some groundwork, the characteristics of the terrain will force us to modify the running gear or suspension of our vehicle.

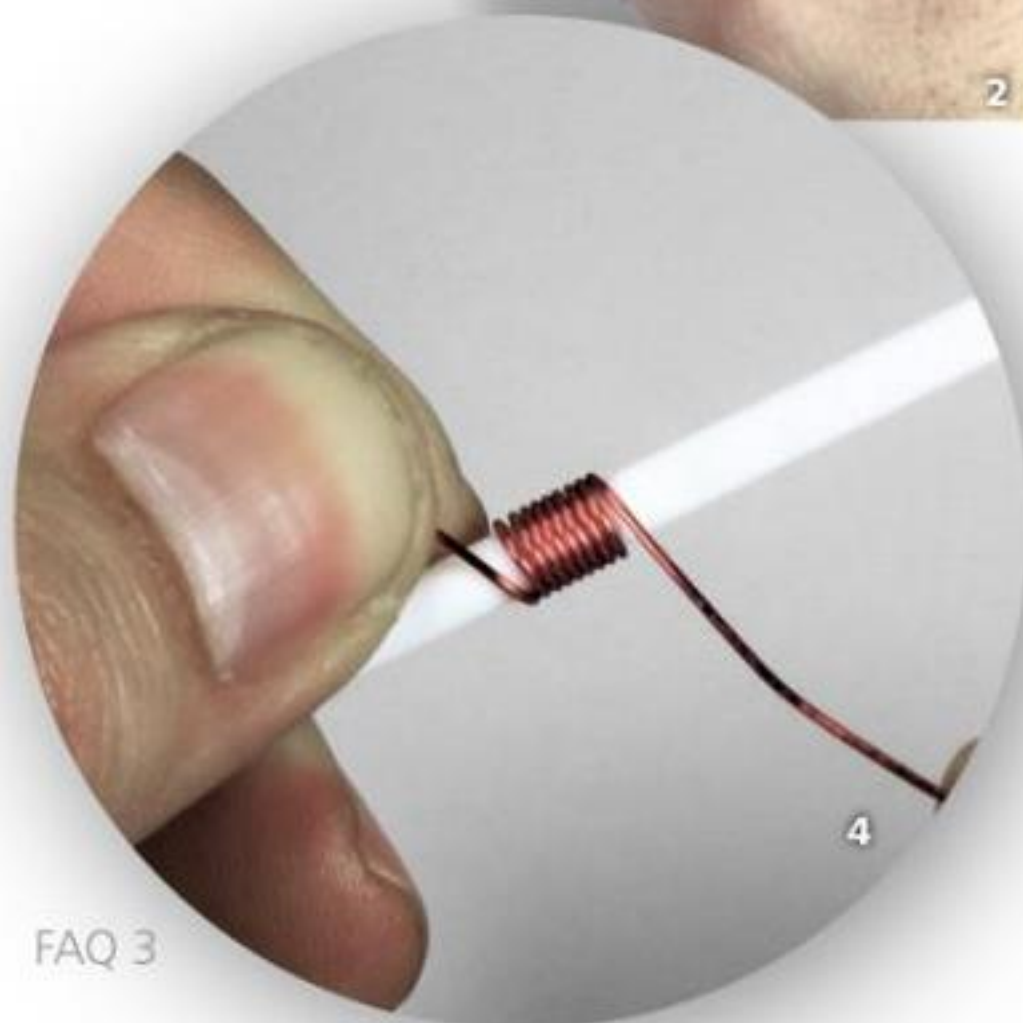
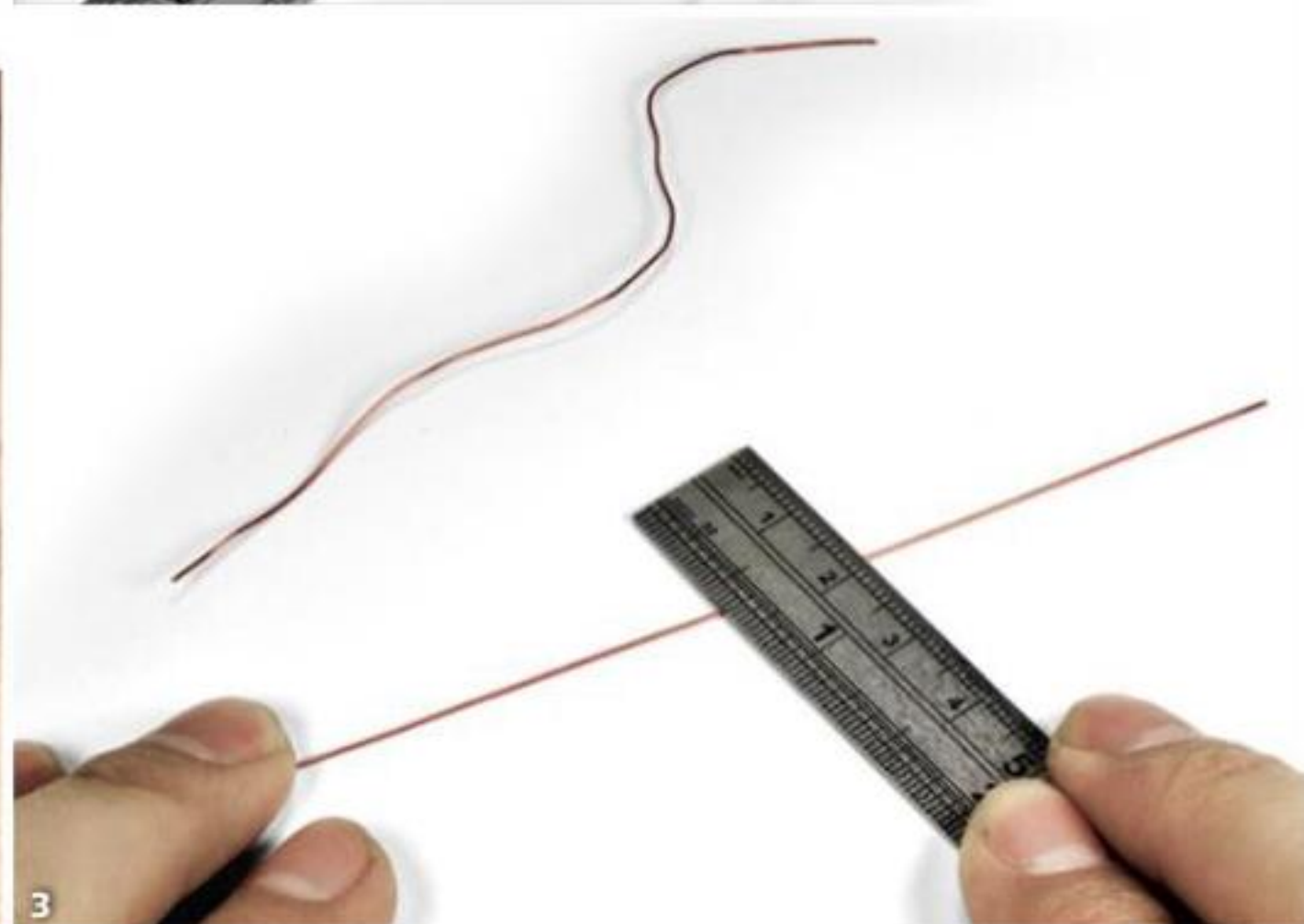
Sometimes there will be no need for modifications. However, if we want to show the vehicle in a somewhat more 'dedicated' position,

like avoiding a rock or fallen tree trunk, we will be forced to do some surgery.

As we will see in the following examples, such modifications are not so difficult and the achieved effect makes our model both more credible and attractive.

Spring suspension

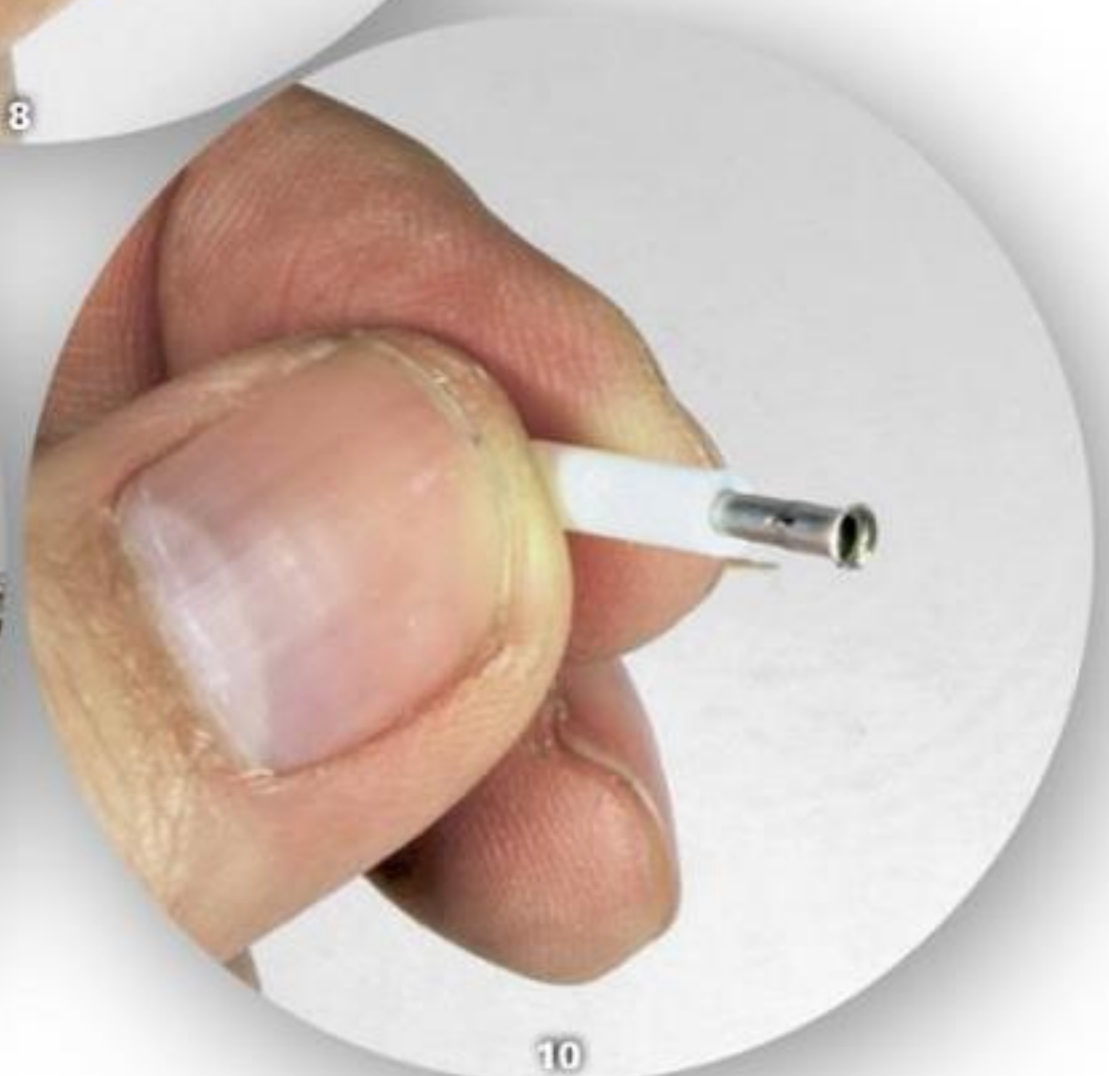
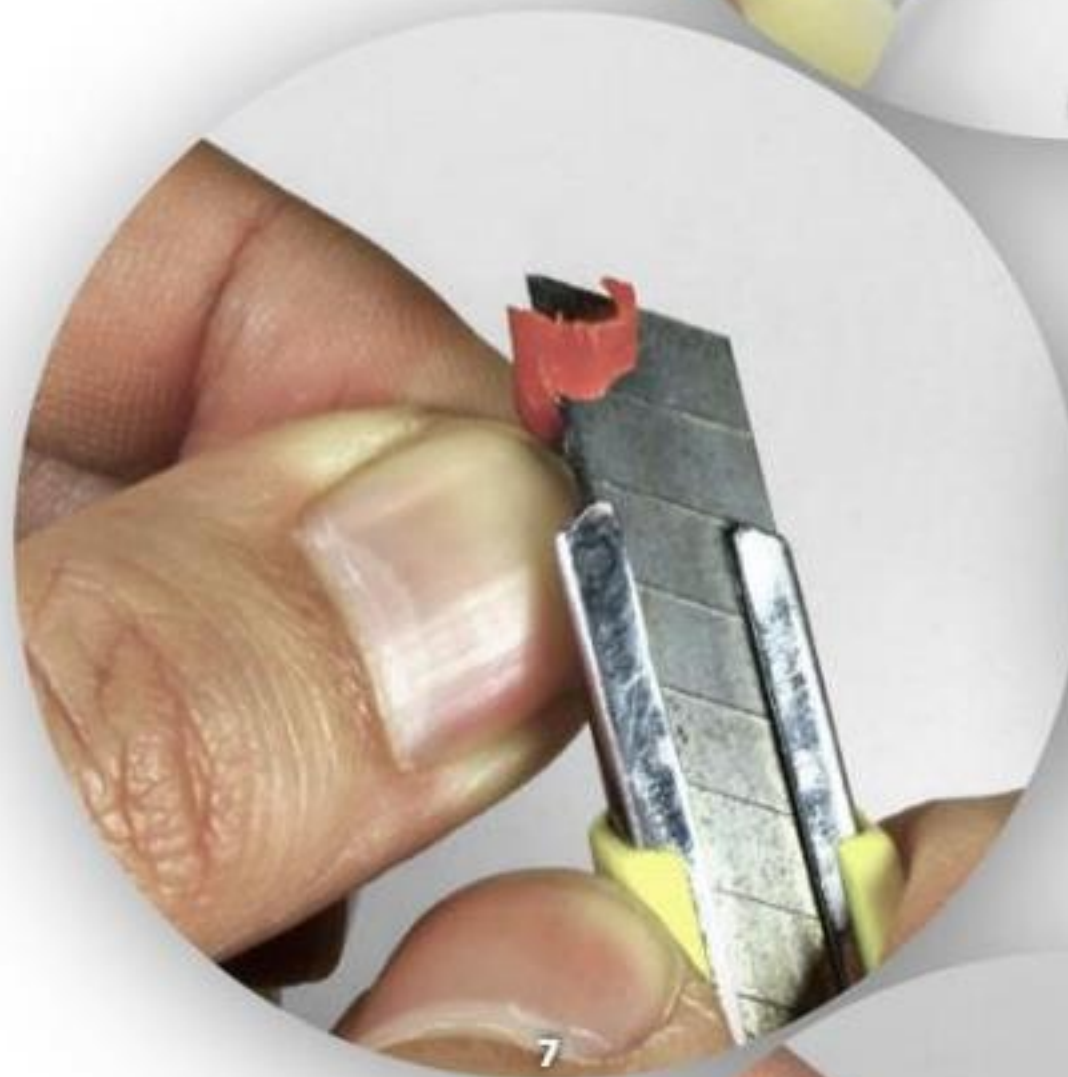
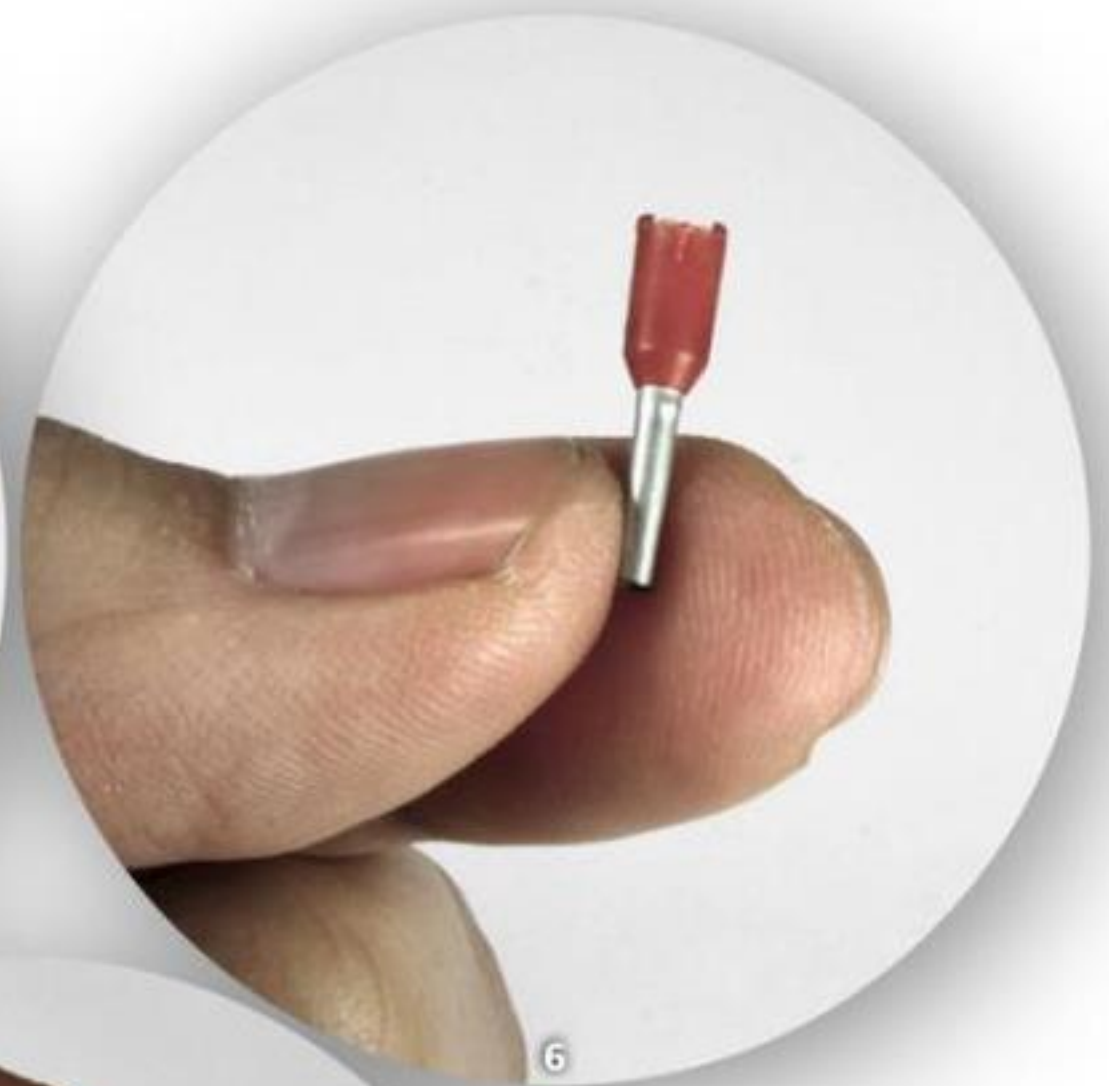
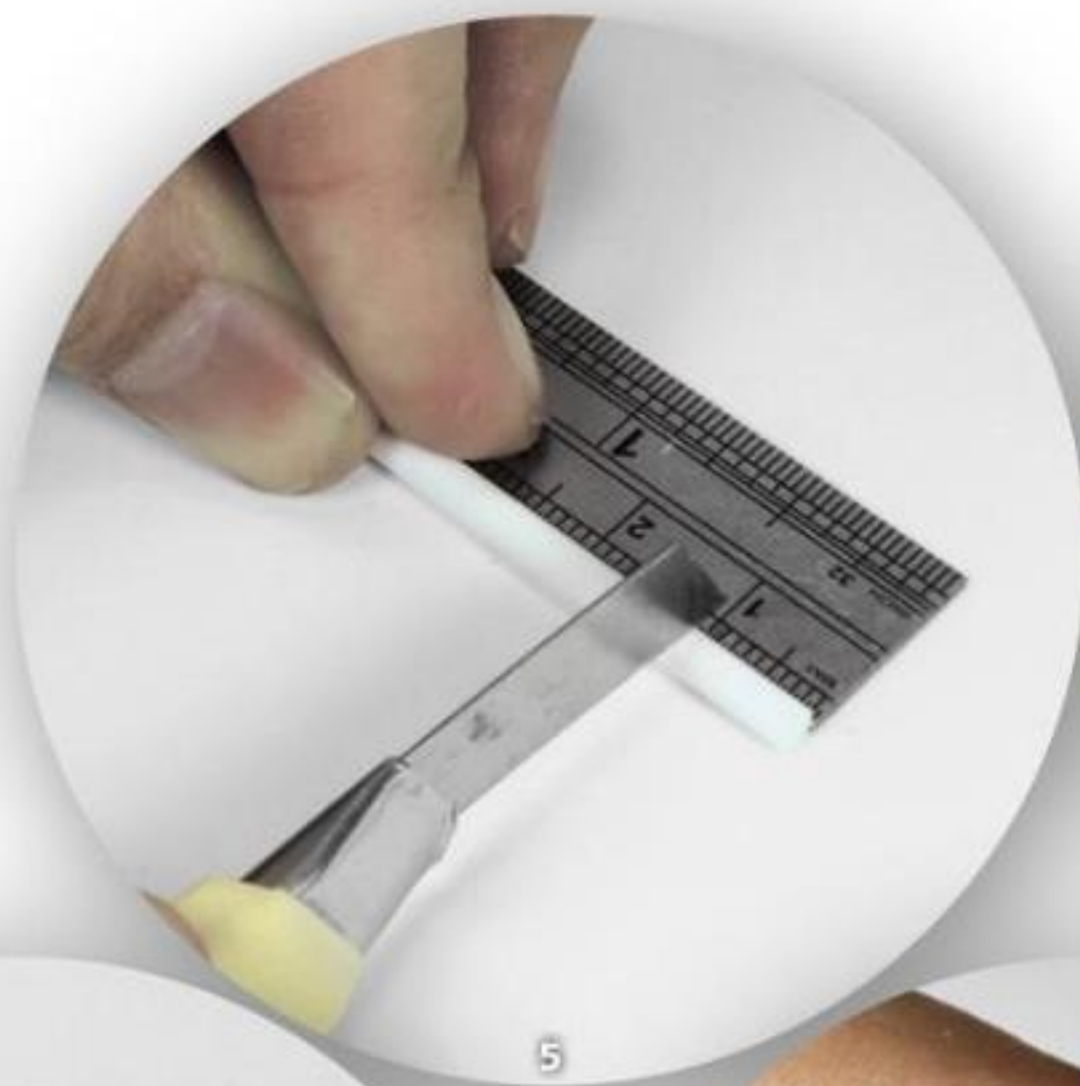
Before you launch into modifying a suspension you really should build the rough shape of the base you will put the vehicle on. This way you will not have to touch up the area once the vehicle is finished. You avoid the consequent danger of damaging parts of your work or messing up the paintjob through rough handling.



(1). The most common materials to improve a suspension system with shock absorbers and springs are thick copper wire (about 4mm in this case), plastic rod of various diameters, a metal ruler and a modeling knife.

(2, 3). We have to straighten the copper wire by rolling it with a hard object, glass jar or metal ruler, on a flat surface.

(4). To make the spring we coil the copper wire around a plastic rod of the appropriate diameter.



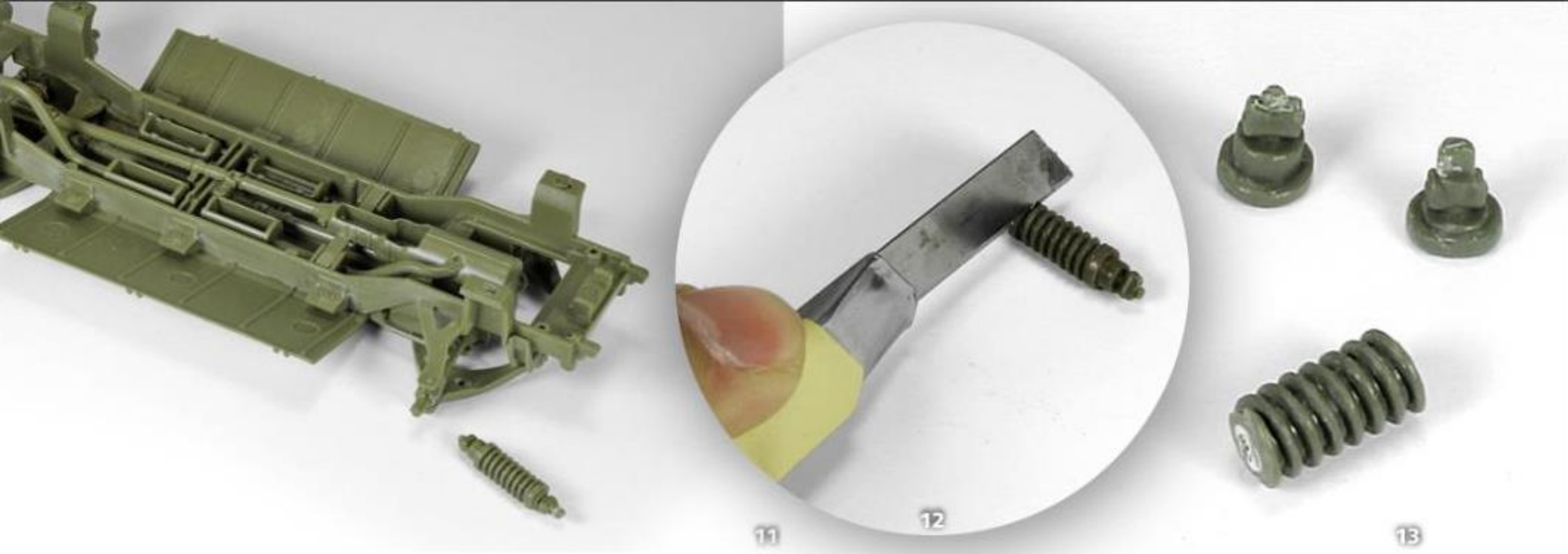
(5). The wide part of the body of the shock absorber is cut from a larger diameter plastic rod. The dimensions can vary, but they will be approximately half the length of the original kit part.

(6). The narrow part is made with another plastic or metal rod, narrower than the previous one. In this case an electrical connection pin of 2mm was used. Be creative in your materials!

(7, 8). We use a blade to remove the plastic insulating cover.

(9). With the help of a drill we enlarge the hole in the plastic rod simulating the expansion bottle, a wider part of the shock absorber.

(10). Next we fit and glue the two parts of the body of the shock absorber.



(11). Next we work on the shock absorbers that we are going to modify.

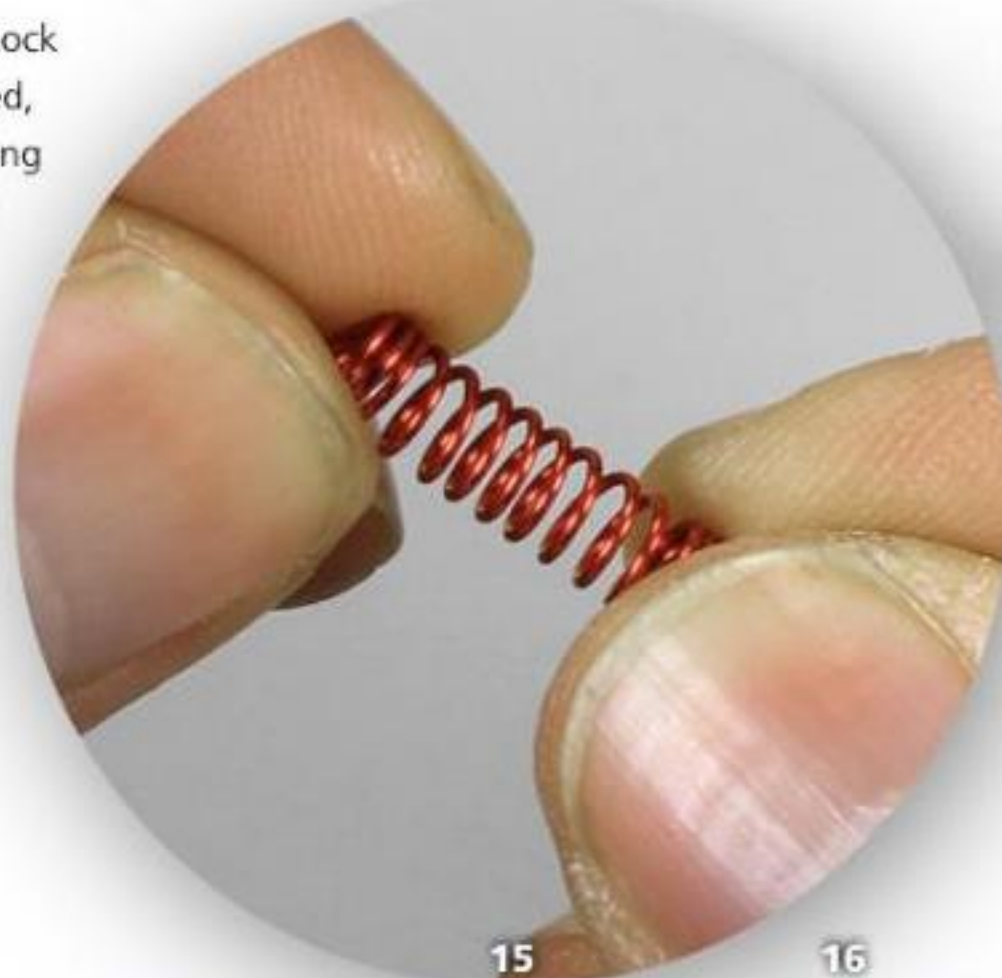
(12,13). We are only going to use the ends of the kit's shock absorbers so we proceed to cut these.

(14). By gluing the ends of the original shock absorber to the body parts we have created a new one.

(15). To complete the assembly we will stretch the spring according to the side of the vehicle and the shape of the ground on which it will be placed.

(16). View of the new, completely finished shock absorber. As long as we do not glue the two parts we can adapt the shock absorber by compressing or stretching the spring.

(17, 18). Once the shock absorbers are modified, we proceed by adapting the trapezoids of the suspension. First we must detach them from the stub with a knife.





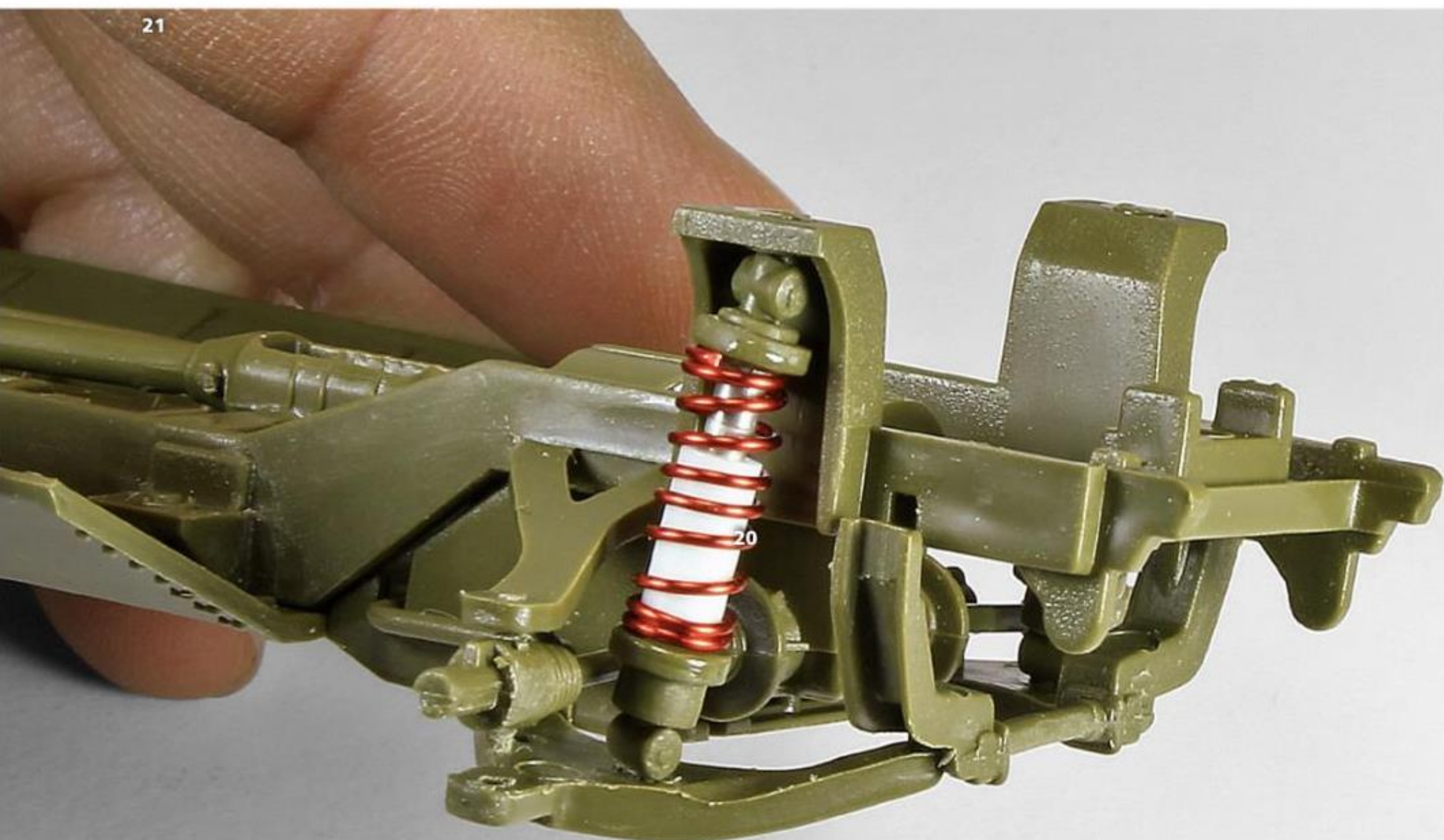
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(19). With the help of flat pliers we modify the angle of the trapezoids, depending on the final position of the vehicle. To obtain a convincing effect it is important to have good visual references.

(20). The introduction of the new shock absorber will be easy as long as the locating pins of the original parts weren't removed.

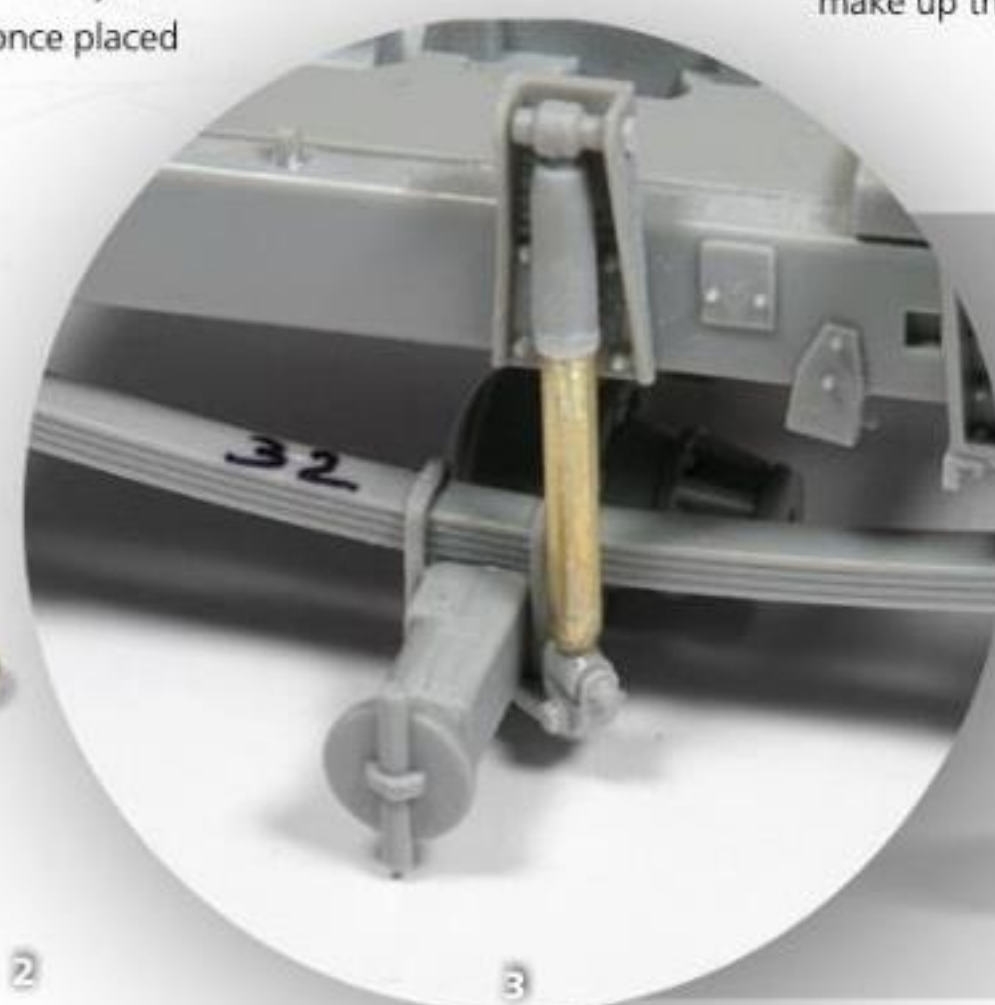
(21). Once in place, we appropriately fix the part. To complete this task we only have to adapt the bearing and glue the trapezoids in their final position.



Suspension system of a truck

In this example we will cover how to modify the suspension of a truck, changing its geometry and therefore the final look of the model once placed on the ground.

We cut the two halves that make up the shock absorbers.



(2). We add a new brass rod with a length that suits our needs.

(3). Once the work on the shock absorbers is completed we have to modify the curvature of the leaf springs adapting them to the new length.

(4). Check the effect obtained with a slight modification of the suspension.

(5). In this example the modification of the front suspension has been combined with a slope on the ground under the rear axle.

(6,7). The effect is reinforced when we put the bodywork in place.



Steering mechanism

Another modification relating to the geometry and appearance of a vehicle is the position of the steering mechanism. Usually kits allow changing the position, but in some cases we need to make the necessary modifications. These are not excessively complex, as we will see below.



The original look of the vehicle with all wheels completely aligned is a bit boring, so changing the steering direction suddenly becomes an interesting option.



(2). We begin by modifying the position of the suspension. We modify the two track-rods and the center link since they are the guidelines. Here we must be cautious and keep in mind certain physical aspects such as the gap for the mudguard.

(3). Next we fix the outer tie-rod ends. This allows us to continue working safely and have the same rotation angle for all wheels.

(4). The modification of the center link is more complex. We will have to be subtle with the blade as not to damage any parts. The top of the picture shows the original center link. The bottom of the picture shows the parts that will allow us to modify its position.

(5). We glue the different sections of the center link and anti-sway bar in the correct position. The position of the wheels determines the change in geometry of the center link.

(6). After these simple modifications we verify whether the adjustment of the wheels is correct.

(7). It is quite apparent that the appearance of the vehicle is more dynamic and attractive.



II.1.6. DAMAGED RUNNING GEAR

The running gear of a tracked vehicle obviously consists of the road wheels, track support rollers and tracks. Sometimes the wheels and/or tracks include rubber parts designed to attenuate the noise and vibrations of the running gear when driving on hard surfaces.

These rubber parts take some serious beating. They frequently have to be replaced. Track pads made of solid rubber suffer a lot of damage in the form of cuts and dents.

The damage isn't limited to rubber track pads. The rubber of the road wheels also gets heavily damaged by wear and tear. It often shows cuts and dents as a result of the friction caused by earth and gravel that gets stuck between the track and the wheel. Larger cuts are usually caused by larger stones.

The best way to reproduce this effect in a convincing way is to look for real-life references and use them as a guide. The worn effect is easy to achieve and the result is quite eye-catching.

Wheels

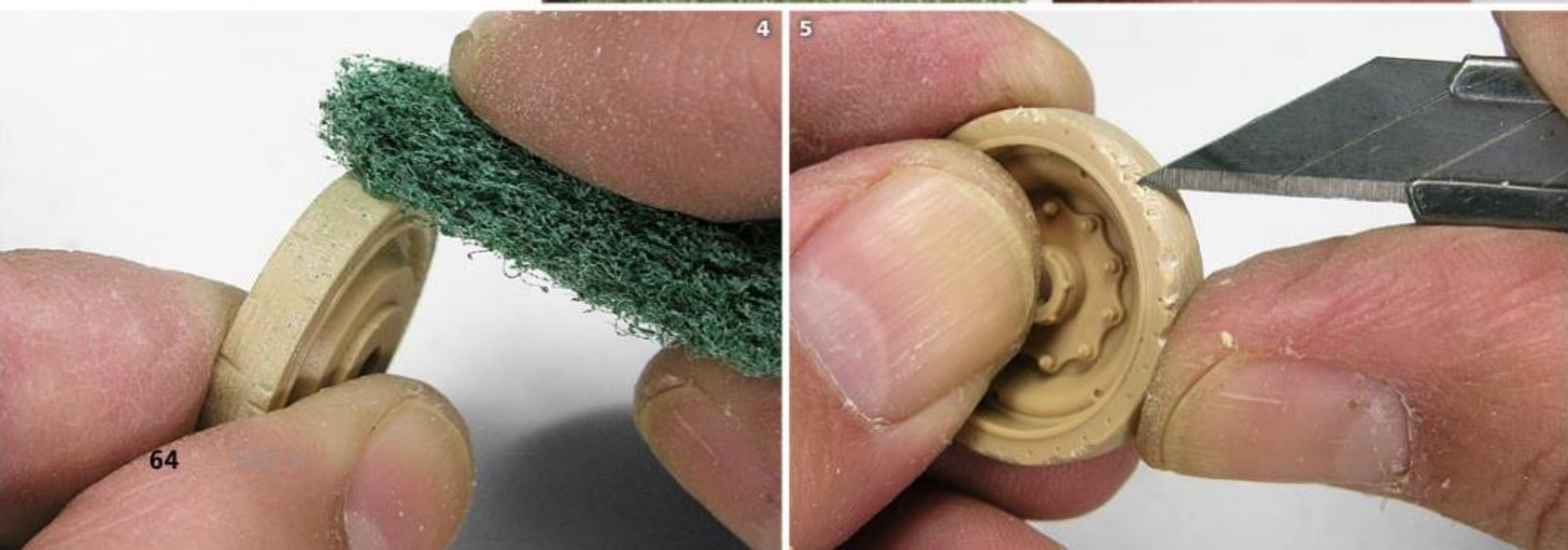
(1). To achieve these effects on plastic or resin wheels we just need some simple tools such as sandpaper, a metal file, a piece of scourer and a modeling knife.

(2). With some coarse grit sandpaper and by turning the wheel against it we will obtain the effect of wear and tear as a result of stones and gravel affecting the rubber.

(3). We use a square metal file and move it in the axis of the wheel to randomly create all sort of cuts in the rubber band.

(4). By rubbing the wheel with the scourer we soften the cuts produced by the file. It also tidies up the sanding process.

(5). With the help of a blade we can add the characteristic dents that are observed at the edges of the rubber wheels. Make sure not to overdo this and watch out for your fingers!





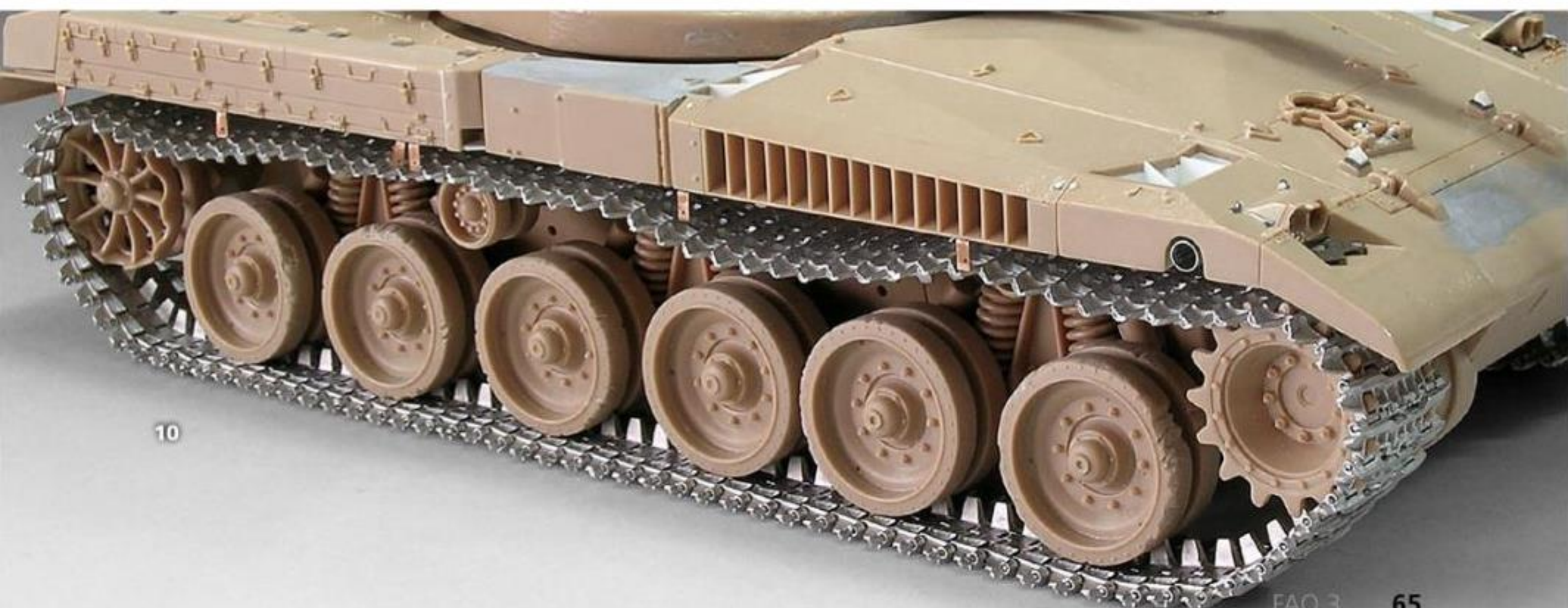
(6). The degree of wear and tear is largely determined by the grain of the sandpaper and the type of file and blade we use, and the way we use these tools. Combined with the use of the scourer this allows us to imitate the effect of sand and gravel affecting the wheels, greatly contributing to a realistic look of the running gear.

(7). In this example, all sorts of damage has been created by using an electric mini-drill and different metal drills.

(8). Then, again with the mini-drill and this time a metal brush, we clean the surface, removing the small imperfections.

(9). Overall look of a set of completely deteriorated wheels ready to be installed and painted.

(10). Once the running gear is assembled, the set of modified wheels really adds realism and added value.



Tracks

(1). The same method and tools can be used to achieve similar wear and tear on the track pads. (Real examples).

(2). After removing the track links from the sprue we use a blade to clean all possible burrs. Next we create all kinds of cuts, dents and irregularities typical for a vehicle in use.

(3). Metal files are also perfect to reproduce other types of coarse cuts in the surface of the pads.

(4,5). With a coarse grit sandpaper we scratch the plastic of the pads to obtain a higher degree of texture and roughness of the rubber.

(6). Once the rough work is finished we can use the scourer to soften the surface, removing any unnecessary remains.

(7). However tedious this work can be, if we compare the links on the left, with the prominent wear, with the original one on the right, we realise it's worth it.

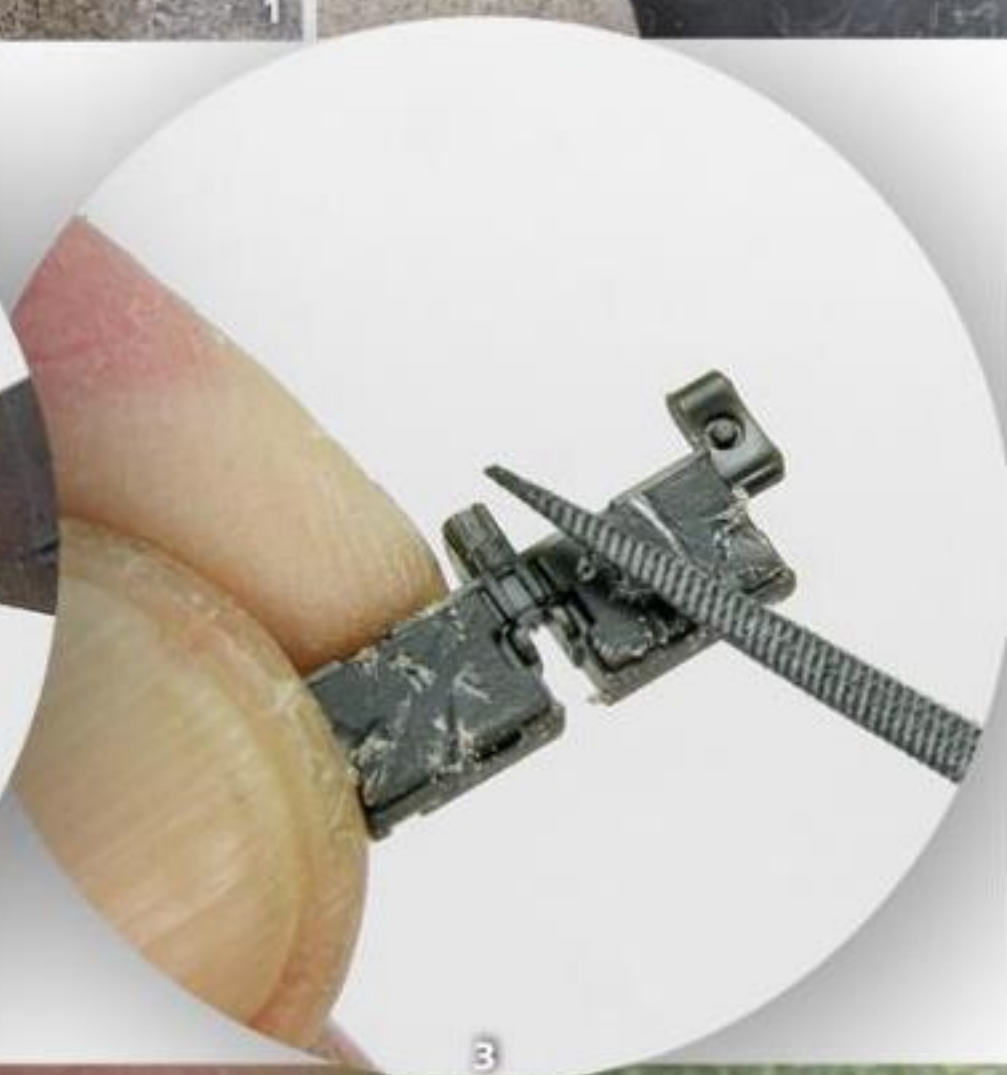
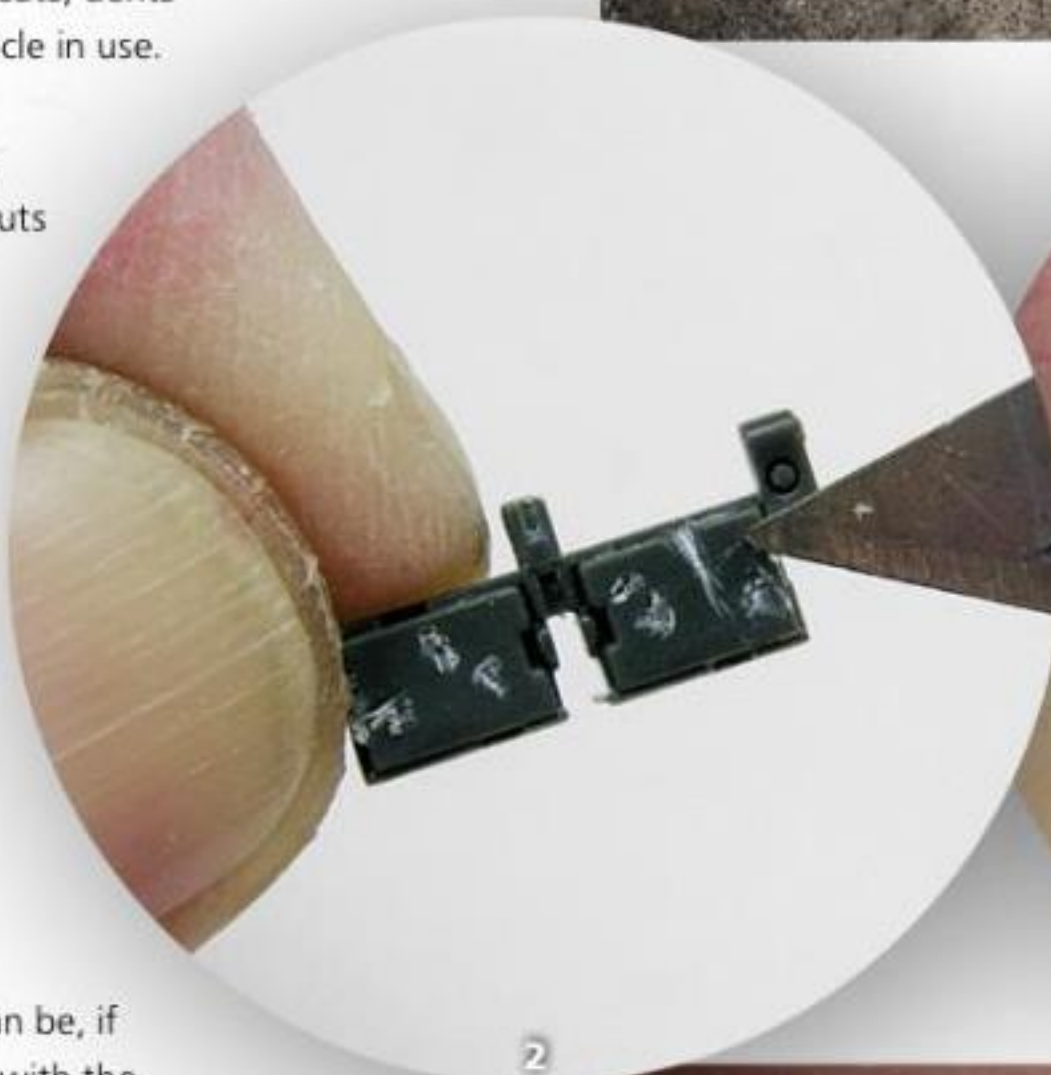
(8, 9). After finishing the work on the pads and the assembly of the tracks, it is advisable to airbrush a good layer of primer. This will not only allow us to better appreciate our hard work, it will also facilitate the application of paint and protect everything for the further weathering steps.

(10). There is another way of depicting wear and tear and guess what, it's faster! First we have to cut the links from the sprue with a knife.

(11). Use liquid glue to create track sections.

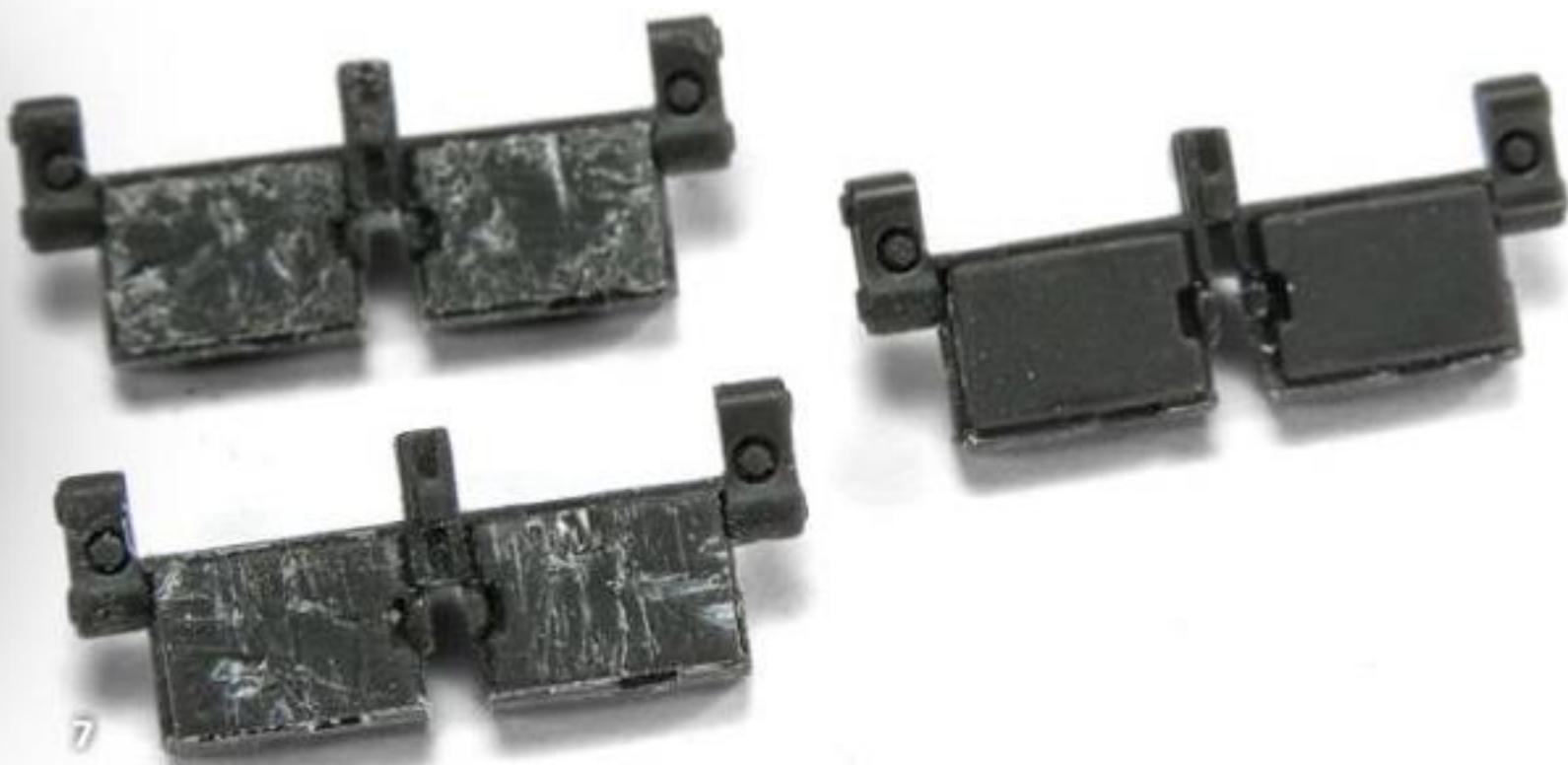
(12). Next with an electric mini-drill and a ballshaped bur we can add all kinds of effects on the track pads in a fast and effective way.

(13). These small details will considerably improve the final look of our model.





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II.1.7. ARMoured VEHICLES

The Merkava in Lebanon, the powerful Russian vehicles in Chechnya and Syria, or the brand new M1 Abrams in Iraq, all have succumbed to weapons as simple as missiles launched by soldiers.

That is why modern combat vehicles evolved to incorporate advanced passive protection systems (also called improved armour), but also active protection such as new reactive armour, all in combination with more sophisticated camouflage systems.

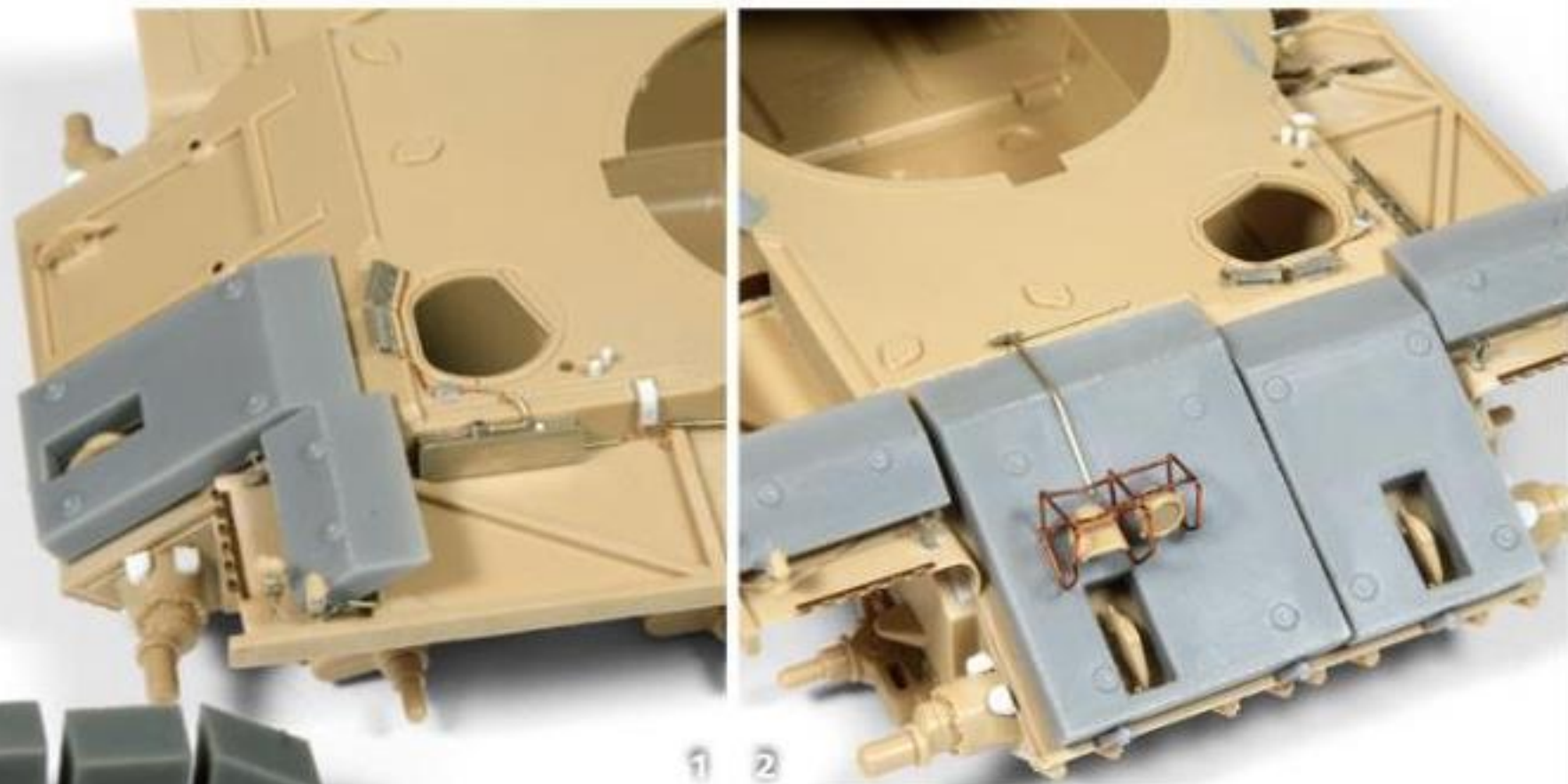
The most current armoured systems are designed to not only protect, but also to try and detonate enemy projectiles. There's "slat armour" or cage shields, or the more advanced "hard kill" systems that try to prevent the projectile from hitting the vehicle.

These advanced systems are part of the vehicles of armies with sufficient capacity and budget. Other armies try to improvise with innovative ideas. We have seen all kinds of materials to create extra protection such as wheels, sacks, welded plates,...

Enigma

The T-55 Enigma is an Iraqi improved version of the Soviet T-55. Although it's not its real name, it was baptized "Enigma" by the coalition forces during the Gulf War in 1991.

The armour used by the Enigma is composed of several boxlike blocks and welded plates to create a kind of spaced armour.



(1). Once the vehicle is assembled we begin adding the shielding blocks using the resin set.

(2). View of the front with the add-on armour completely assembled. The resin blocks include extra details.

(3). The side blocks are individual elements allowing us to perform certain modifications with respect to the originals.

(4). The back of the blocks also includes some nice improvements.

(5). Separate blocks allow us to glue them out of alignment, creating a much more dynamic look.





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(6). Overall look of the vehicle with the add-on blocks in place.

(7). Check out the blocks at the back of the turret compared to the original single-piece ones.

(8). Once glued on the turret and somewhat misaligned they provide a high degree of realism.

(9). We kept the original turret armor, but improved it by replacing the springs.

(10,11). Once the vehicle is assembled with the additional armour the look has considerably improved.



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Mexas

MEXAS is a type of advanced armour composed of three different materials, developed by the German company IBD Deisenroth Engineering. Although the exact formula is unknown, it is known that MEXAS is obtained by combining a thick layer of an extra-hard, special nylon, a second layer of a special type of ceramic material (alumina), and a third layer of fiber kevlar. MEXAS stands for "Modular Expandable Armour System".

As in the previous case, this armour is not part of the structure of the actual combat vehicle. It is added to the steel or metal alloy plates of the vehicle.

(3). We glue them while adding some reinforcing plastic sheet at the backside. While we are at it we incorporate small steps between the different sections.

(4). Assembly of additional side armour without any modifications to the sides.

(5). Overall look of the assembly and its different sections on the turret and the front.

(6) Observe the composition of the turret and side armour with some of their misaligned modules.



To improve the original armour of the model we cut the slab in various sections.



Once the slab is cut in its various sections we glue them with some misalignment.



Overall look of the model with the armour added and its different sections on the turret and the front. It looks much more realistic.

Metal plates

So far we have seen advanced armour that is completely integrated with the vehicle. This implies that the paint job will follow the painting of the vehicle itself.

The next type of armour is totally home-made. It's more of a field modification by the crews themselves and often improvised with found materials.

These types of armoured plates are only effective against impacts of light weapons. It is not uncommon for them to be unpainted and for bare metal to be exposed, often making them rusty.

(1). To create these kinds of plates we can use 0.5 mm plastic sheet although you can vary the thickness. We measure directly on the plastic and we cut with the help of a metal ruler and a good sharp blade.

(2). If we want the part to look like several plates welded together we will have to carefully mark the panel lines, engraving them with the back of a blade. We must accentuate the edges removing part of the plastic.

(3). It is very important to add texture to the edges to simulate the torch cut of the plates. Depending on the tool we use we can go for a light or heavy application of this effect. With a flat file we can add all sort of imperfections. Apply some liquid glue to remove the residues and soften the effect.

(4). Observe the texture obtained along the edges of the plate.

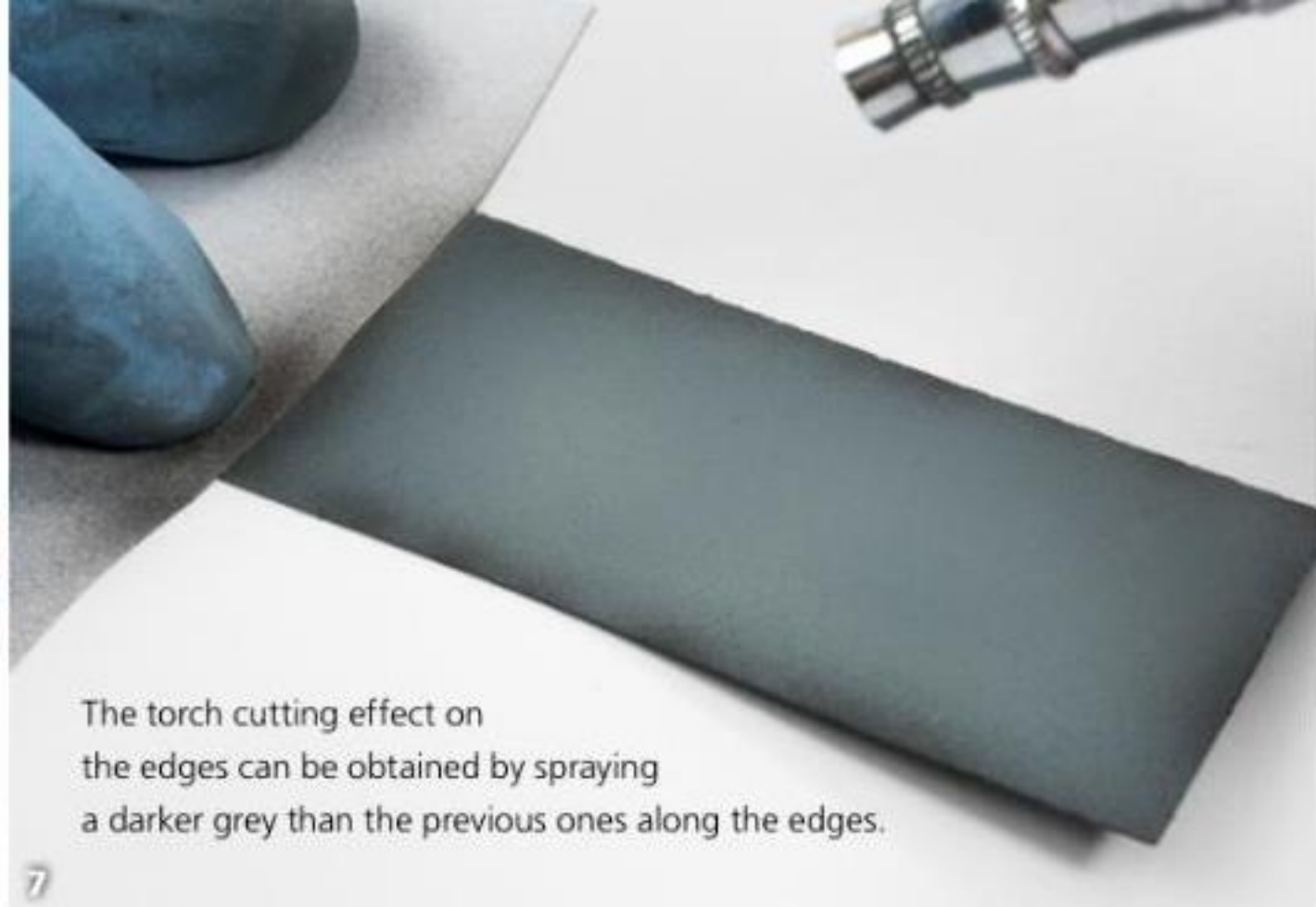
(5). The cargo box of this truck has been completely armoured on the battlefield.





To imitate rust on the armoured plates we can airbrush two shades of gray in a random way.

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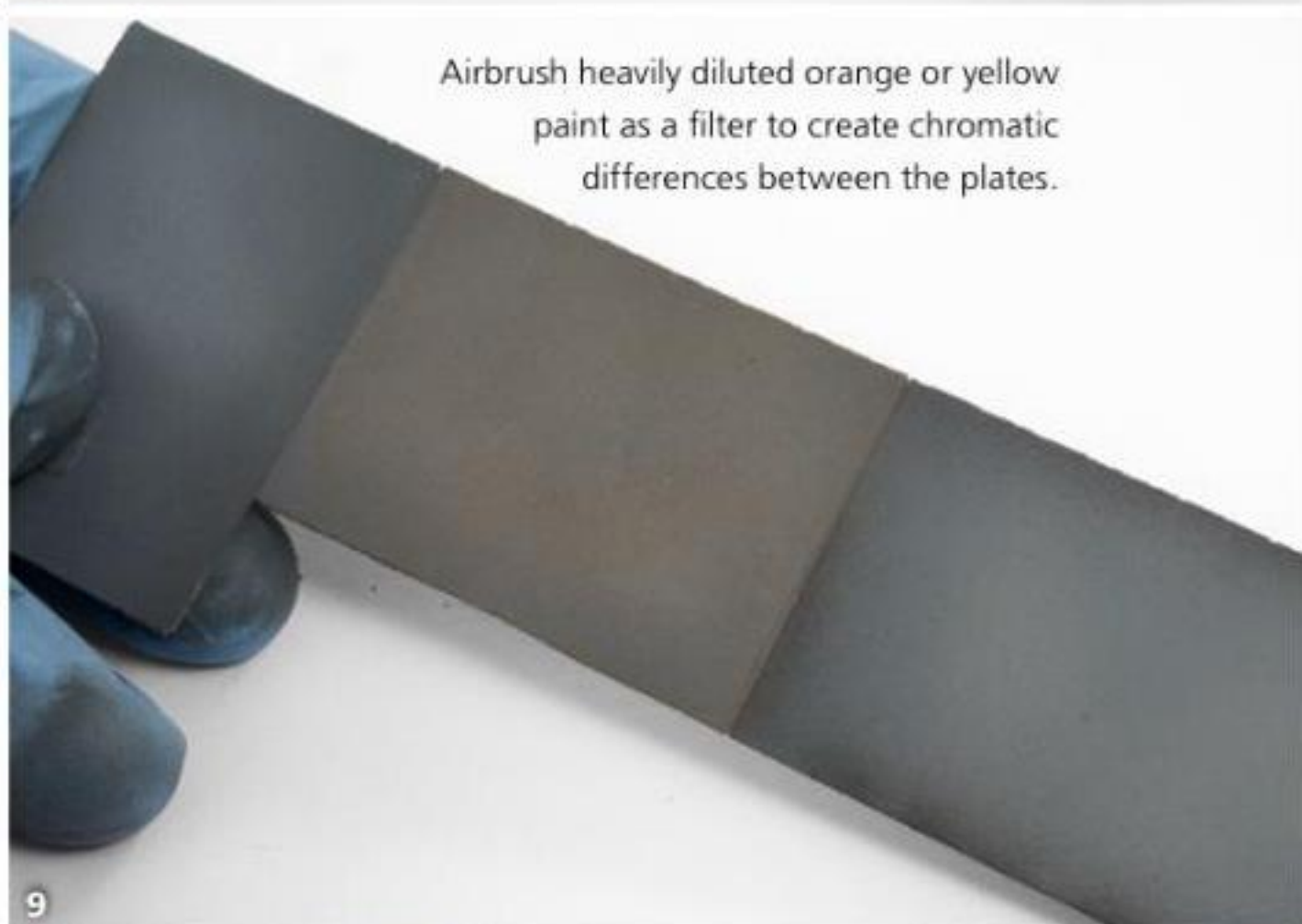
The torch cutting effect on the edges can be obtained by spraying a darker grey than the previous ones along the edges.

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We apply some fine splashes of a light blue colour to get some texture.

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Airbrush heavily diluted orange or yellow paint as a filter to create chromatic differences between the plates.

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(10). Then we apply rust using sponges of different shapes and sizes. It is best to use reference pics and to test on a piece of paper. It is advisable to use a range of rust tones, a light, a medium and a dark tone.

(11). We apply oils in the corners, blending them with a clean brush moistened with White Spirit. In the palette we combine a light colour, a medium and a dark one, to our liking.



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(12). Here we apply a soft splash with a dark brown enamel and a stiff brush. This increases the chromatic richness.

(13). The fresh oxide is created with Abt.020 Faded Dark Yellow oil with an orange appearance, or combined with Abt.060 Light Rust. First we apply the oils and then we blend them with solvent. We apply this effect like streaking grime.

(14). Finally we apply rusty pigments in some spots to obtain a strong contrast between satin and matt surfaces.

(15). Final view of the armoured area and the contrast between the wood and rusty metal surfaces.

(16). The general appearance of the vehicle with the armoured plates looks totally different in respect to the model kit design.



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Welded slats

Another type of home-made armour, and in a certain way improvised, consists of a shield of metal slats welded to a metal structure. Although only effective against some types of projectiles the armour is quite eye-catching. It has been spotted on heavy and medium vehicles in several recent conflicts.

As in the previous case, this shielding is not part of the structure of the combat vehicle, but is added to the steel or metal alloy plates with which the vehicle is manufactured.

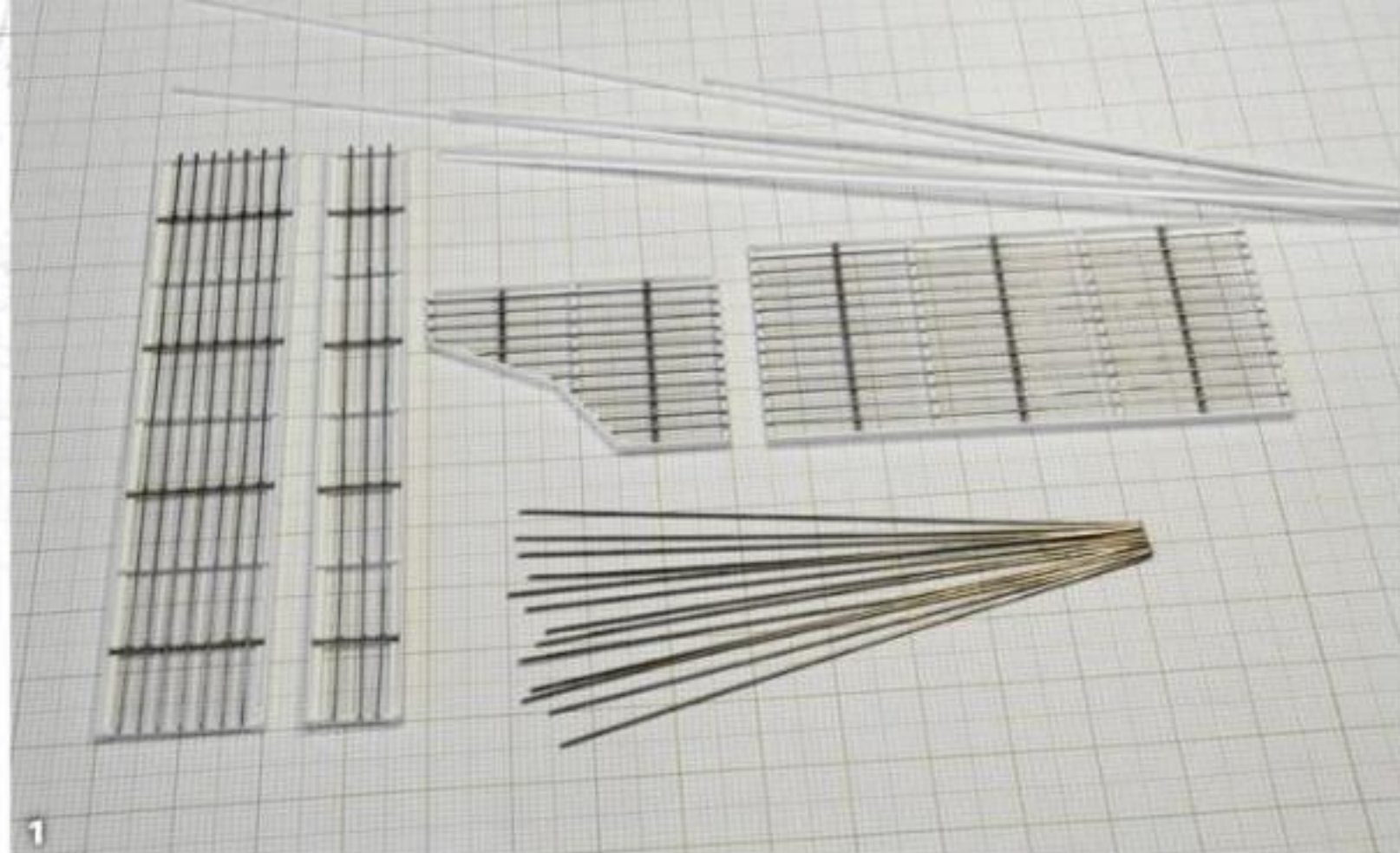
(1). Once we have decided which parts of the vehicle will go protected by the slats, we build the external structure with plastic rods, with the help of graph paper.

We also add the necessary plastic reinforcements and brackets. The "cage" is made with rods of different size diameters, one for the horizontal and one for the vertical reinforcements, both in metal.

We glue the reinforcements on the initial plastic structure and then glue the rods parallel to each other. Creating this type of structure is quite tedious and the construction is somewhat fragile, but with the help of graph paper it can become very attractive.

(2). Once all the parts are finished and test-fitted on the model, everything is painted prior to its final installation. We use different paints, both acrylic and enamel, and different rust tones.

(3,4). The final look after glueing all the structures on the vehicle is very colourful, not only because of the structure itself, but also because of the choice and distribution of colours.



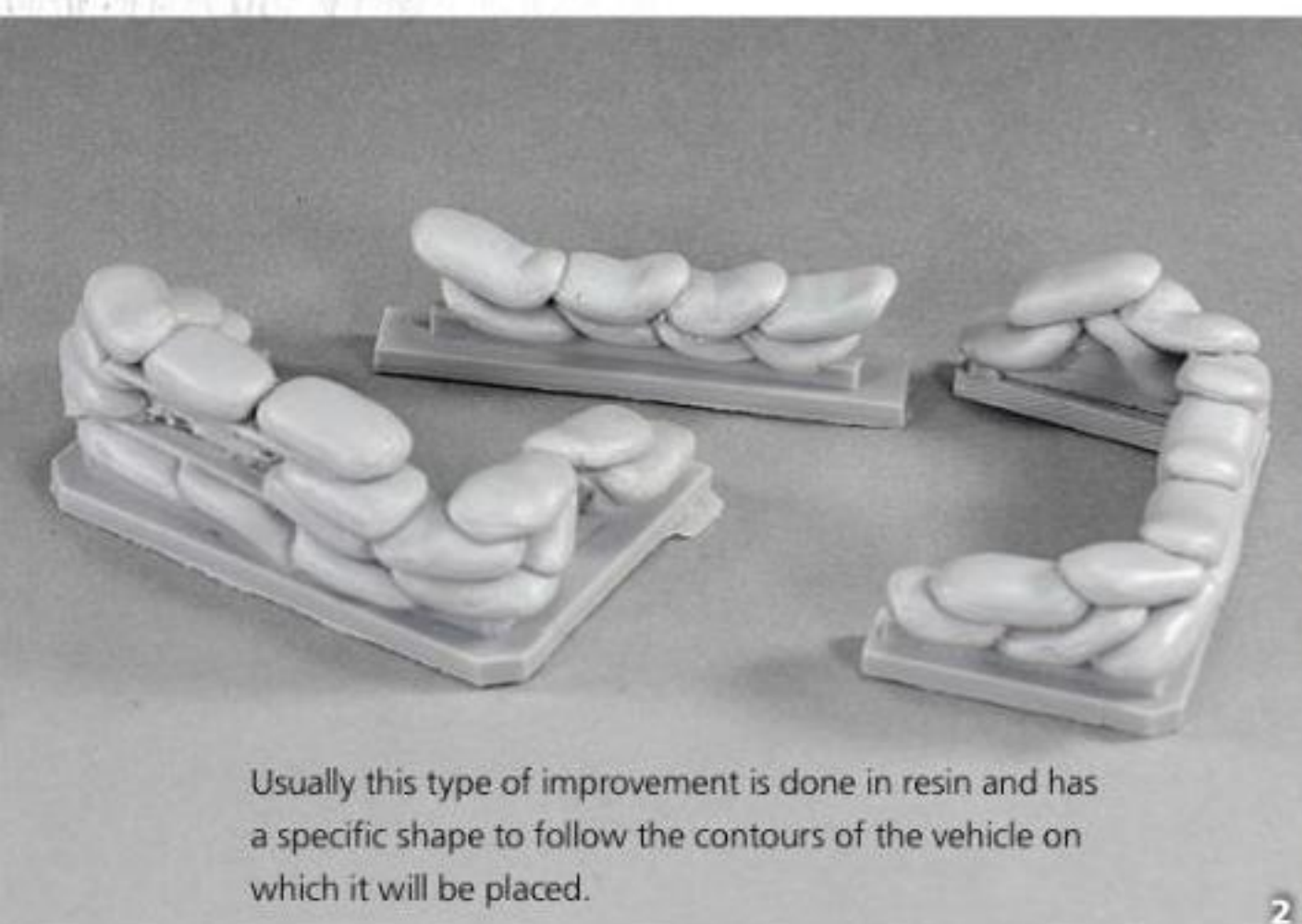


Using sandbags

We will cover a final 'uparmouring' technique, also home-made and improvised, namely the stacking of sandbags to protect both the crew and certain areas of the vehicle from light impacts.



The tools required to work on resin are the usual ones: blades, a small saw and cutting pliers.



Usually this type of improvement is done in resin and has a specific shape to follow the contours of the vehicle on which it will be placed.



To avoid damaging the parts we start by marking the spot where we will cut between the casting blocks and the parts.



Next we separate both parts with a small saw, firmly holding the part or placing it on a solid surface.

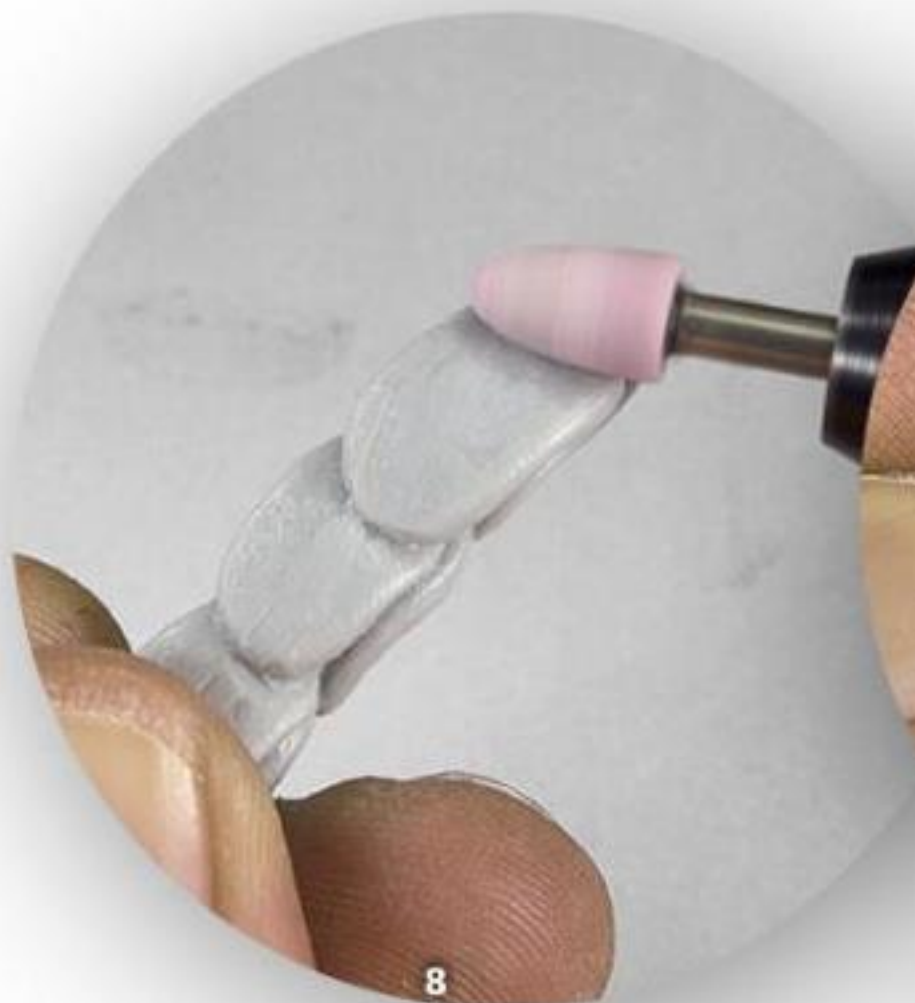


Don't rush when cutting or sawing since it might damage the part.

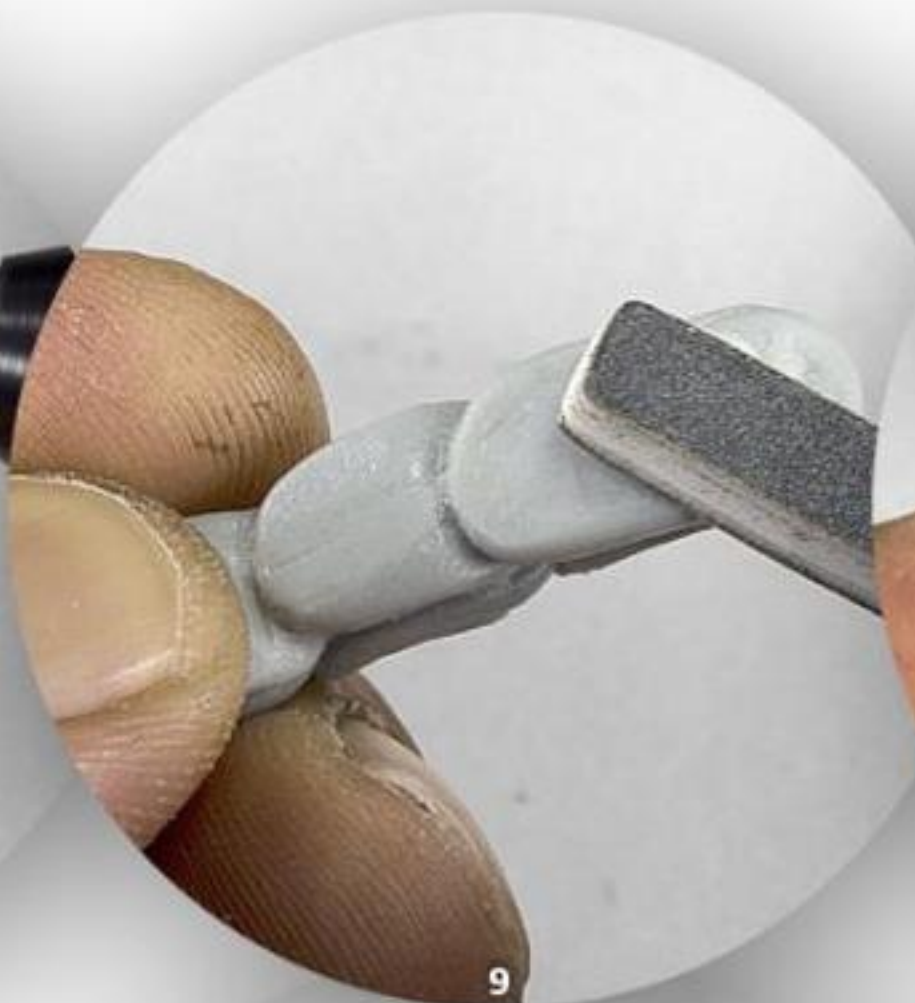


(6). We can snap off left-over parts of the casting blocks with cutting pliers.

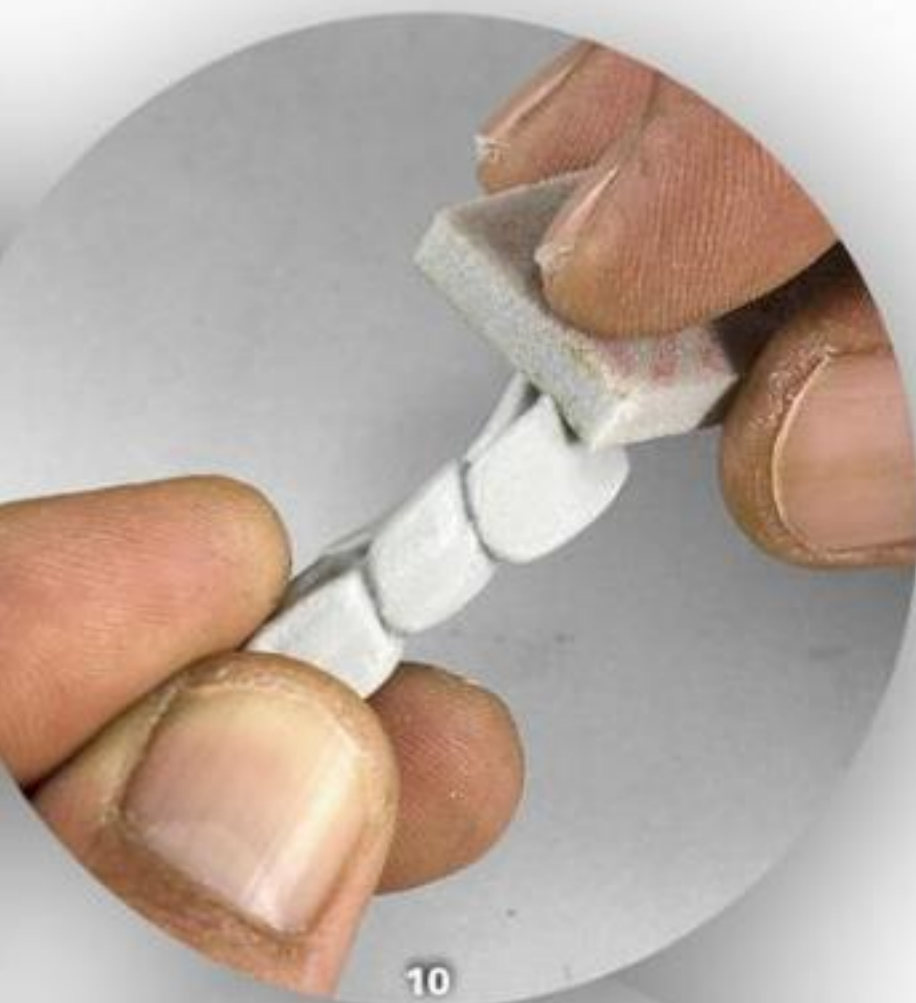
(7). We continue the cleaning phase with a blade and by using sandpaper. Be aware that resin dust is bad for your health. Use a bit of water to prevent the dust from flying around or wear a mask.



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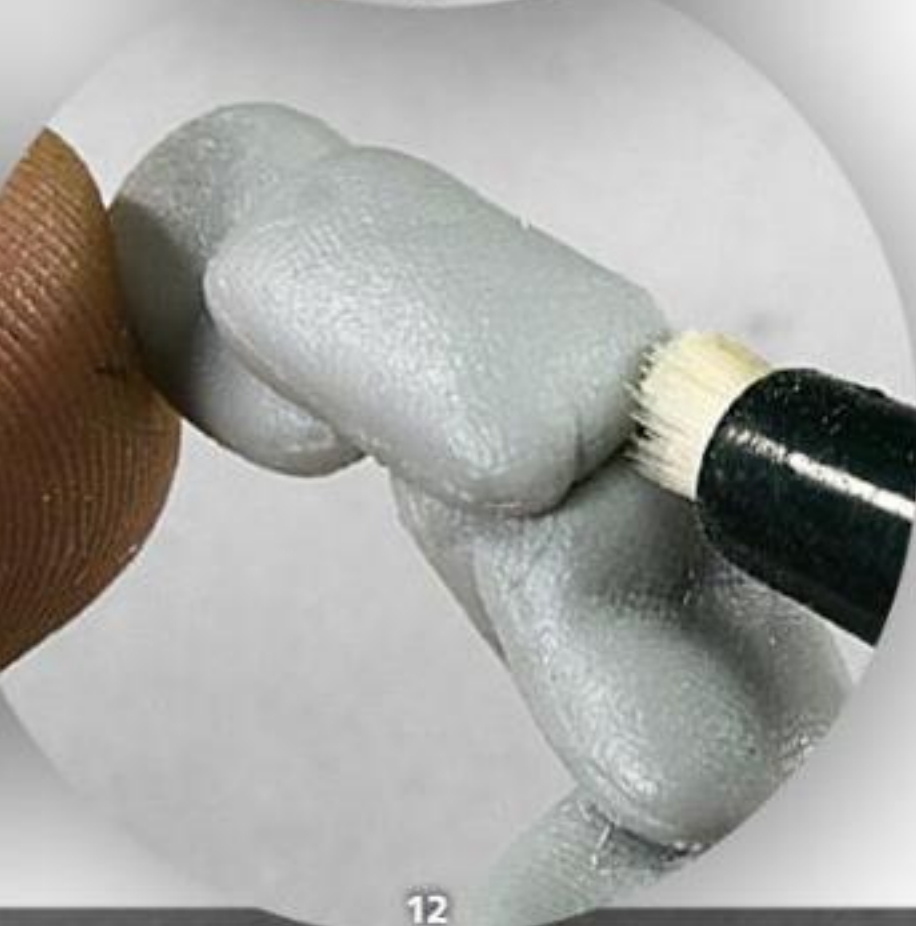
(8). We start test-fitting the parts. We use a mini-drill and a milling cutter for further sanding.

(9). With the help of sandpaper we remove any marks left by the previous tools during the process of removing the casting blocks.

(10). With the help of a flexible sandpaper we sand the surface of the sandbags to achieve a smooth and uniform finish.



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(11). After sanding, we will probably have damaged part of the typical seams of the sandbags. Use a sharp blade to engrave them.

(12). Use a fibreglass pen moistened with water to smooth the surface.

(13). After we have treated all parts we check the gaps in between the parts. We must make sure that they perfectly adjust to the kit before adding them permanently to the vehicle.



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(14,15). Once we have cleaned all the parts of the improved armour set, we should test fit them on the vehicle. Each part should be fixed in the corresponding place. Sometimes a small modification of the vehicle's surface is necessary.



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FAIRPLAY 177



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(16). Using the mini-drill with the proper burr we begin to cut down the parts that need to be removed to fit the sandbags. These are the sections that we have previously marked.

(17). We continue grinding with different tools until we achieve a perfect fit.

(18). Finally, with some flexible sandpaper, we eliminate all possible marks and scratches remaining after the grinding process.

(19). Before fixing the parts in their definitive place, we verify that they fit correctly.

(20). Possible gaps can be filled by modeling additional sandbags or by intelligently placing some stowage.



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The overall look of the vehicle with sandbag-based protection. The addition certainly increases its attractiveness and cries out for some figures to justify all the extra work.



Sandbags can be made with two-component modeling putty. When we are kneading it we can add some talcum powder so it doesn't stick to our working surface. We take a piece of putty and start shaping it according to the type of sandbag we want to create: a full sandbag, or a more flat one for instance. The side seam is made with a blade while the putty is still fresh. You can texture the bags with a piece of fine wire mesh.



II.1.8.

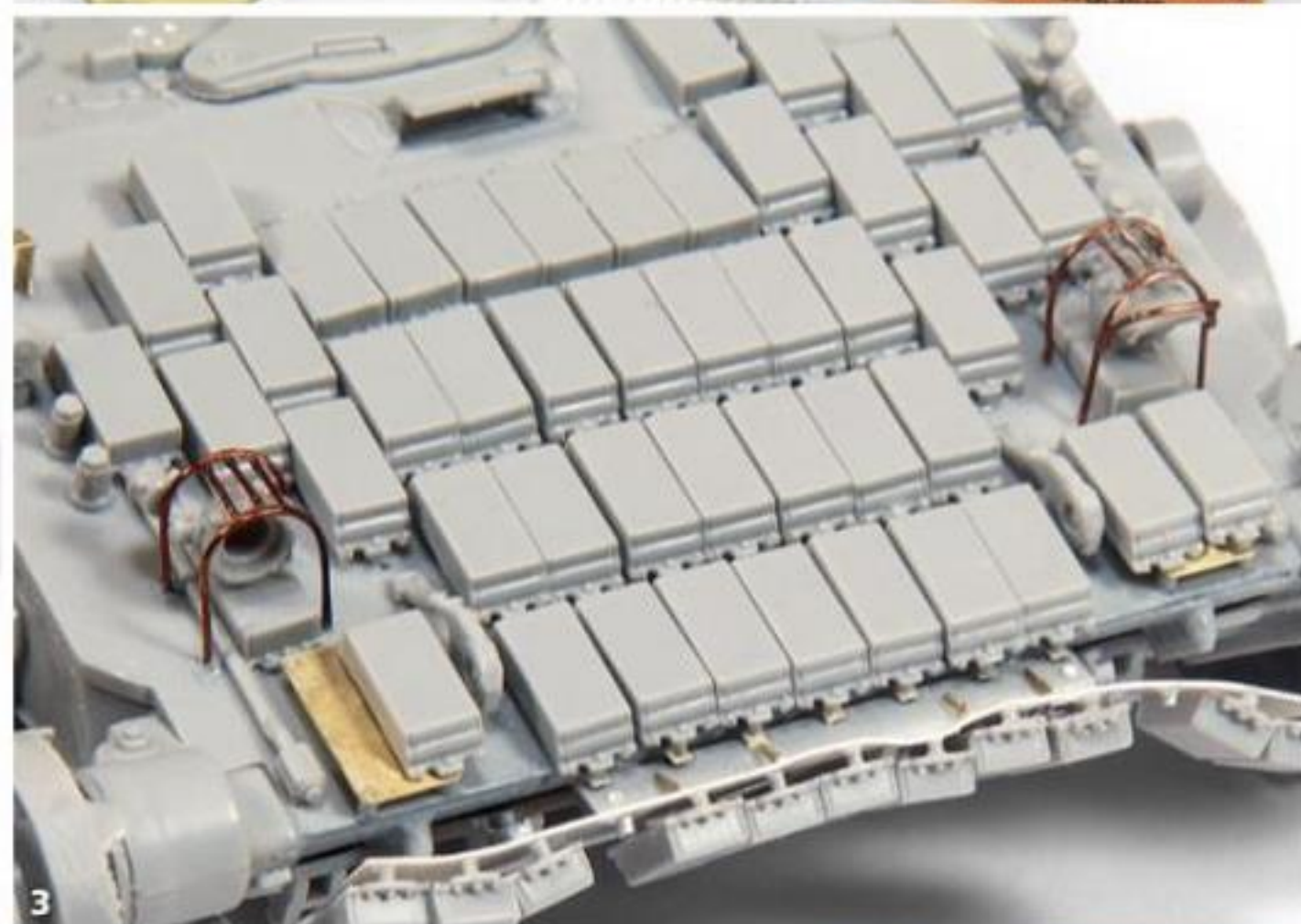
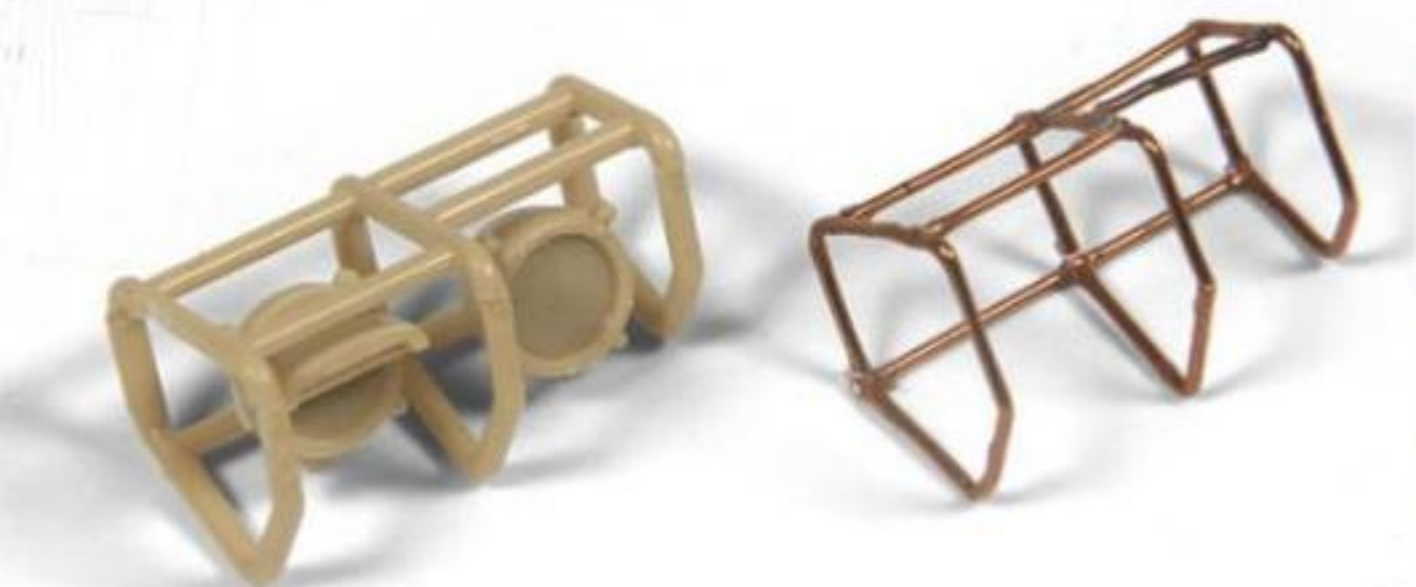
HEADLIGHTS, PERISCOPES AND GLASSES

The assembly and painting of the glass sections does not present a major problem except for the correct masking off what we previously painted. A good protection will guarantee a correct result and the eye-catching look of some glass parts, ready for the following phases.

It's advisable to use masking tape or a liquid mask. The choice depends on the position and size of the clear parts.

HEADLIGHTS

- (1). Sometimes the optics that the manufacturers include are not accurate and their replacement is a must. Luckily we have multiple commercial options.
- (2). Merely replacing the headlights may not be enough. Even though it is a tedious and delicate task, we should consider replacing the protectors. With patience, copper wire and cyano glue we can rebuild almost any protector.
- (3). Once glued, they will resist any kind of weathering and their appearance improves considerably.
- (4). The original optics of this Merkava force us to do a delicate paint job. The coloured plastic makes it difficult to reproduce the effects of the glass surfaces.
- (5). To replace these optics we must use a hand drill and the appropriate drill bits to hollow out the headlights.





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(6). Once the new headlights are selected and installed, the new look radically improves the realism of the model. They only require a bit of weathering.

(7). The optics of this Bradley have been replaced by some far more realistic MV Lenses. They are fixed with white glue to prevent stains on the clear surface.

(8). The direction indicators are dyed with transparent inks of the right colour.

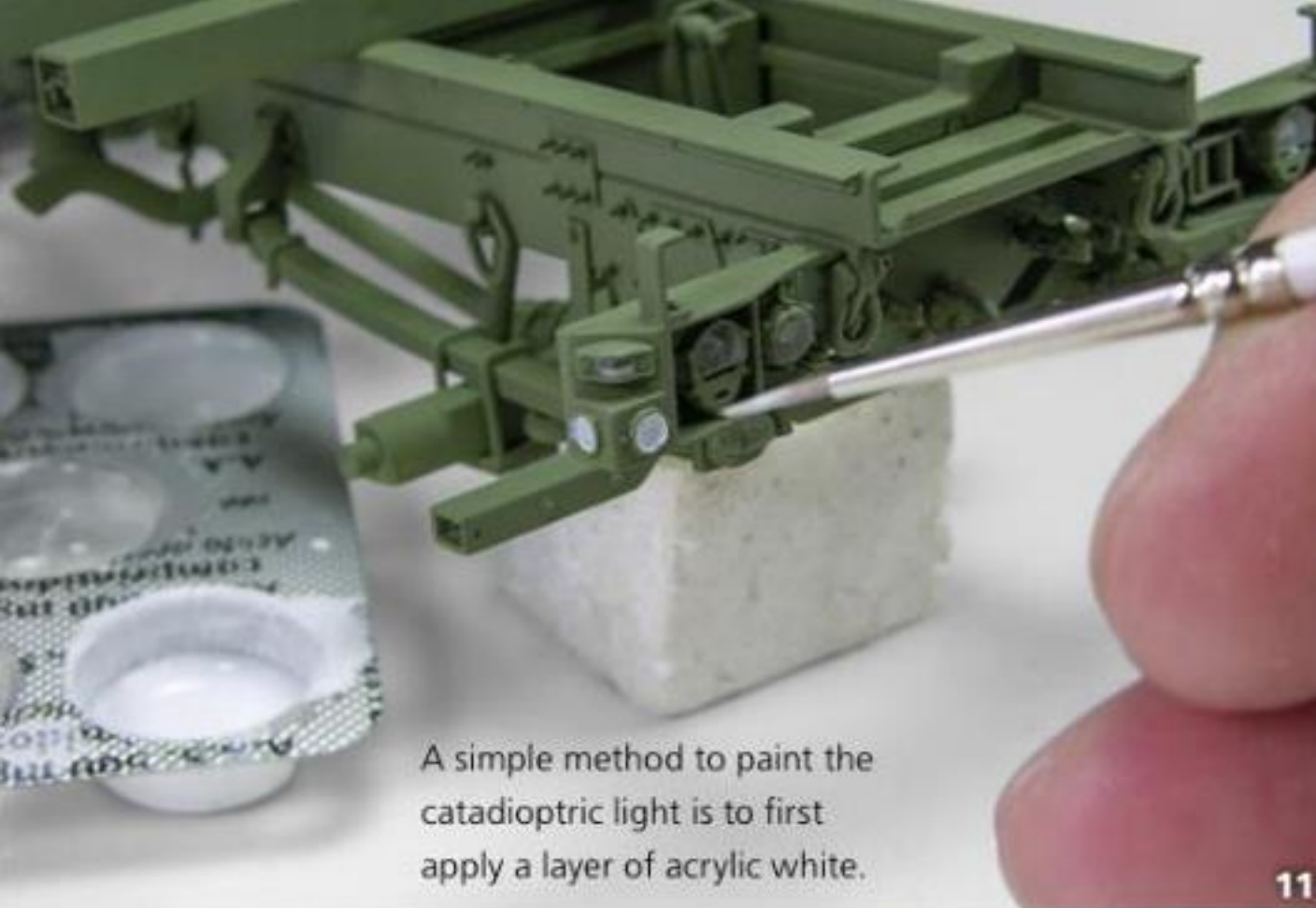
(9,10). The final look. Paying attention to these kinds of details allows us to depict them as realistically as possible.



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A simple method to paint the catadioptric light is to first apply a layer of acrylic white.

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Next we apply a drop of transparent lacquer of the right color. Let this dry completely until you achieve the desired brightness and depth.

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We can also use clear lacquer paints to dye the headlights. This yields very good results.

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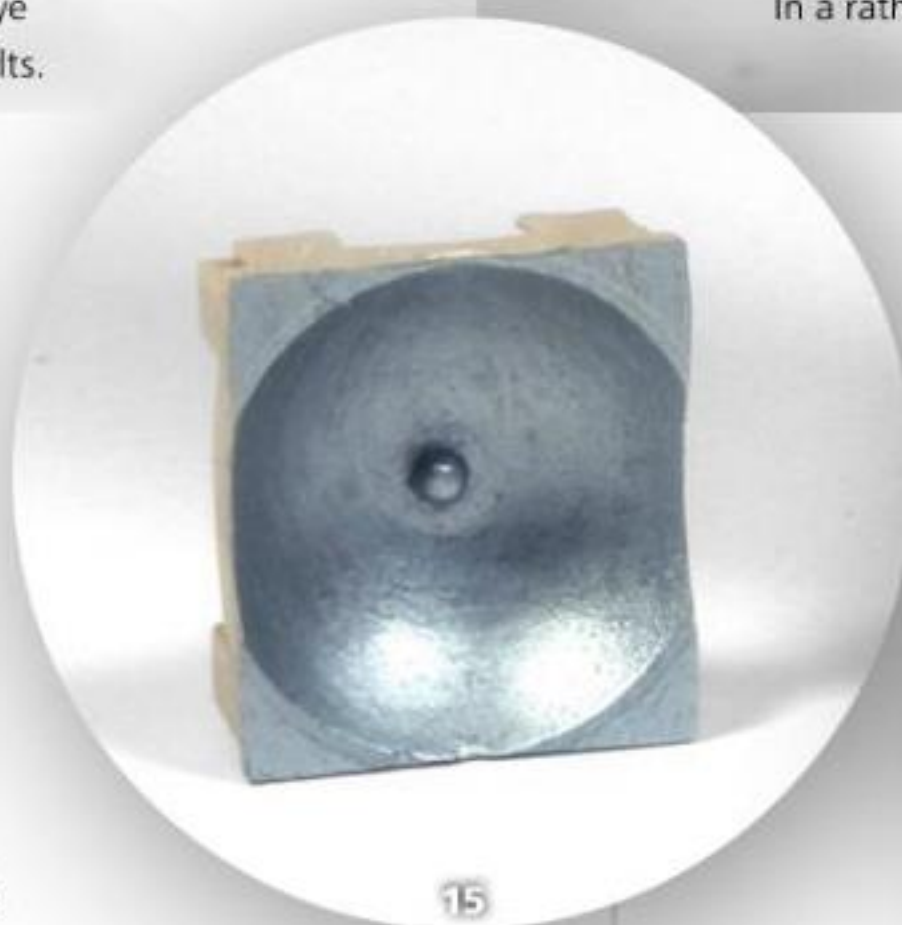
Observe the final effect. In a rather simple way we obtained a realistic result using acrylic white paint and lacquers.

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(15). In the case of external projectors installed on some vehicles it will only be a matter of masking them properly. We start by painting the projector base in the right colour.

(16). Next we complete the assembly and mask the area that we painted in the previous step. For this we use a liquid mask with the product Maskol.

(17). After the paintjob we only need to remove the mask and check whether the result is satisfactory.



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There are many suitable colours with a transparent finish to properly paint periscopes and basically any glass element.



There are several options depending on how the kit part is supplied. In this case the periscopes are one glass part. This allows them to be painted in a totally independent way, without the need for masks.



After checking the fit we can continue painting the rest of the vehicle.



Once the painting and weathering work is finished, we just need to glue the periscopes and apply some dust or dirt.



(5). In this other example the periscopes are manufactured from a piece of cardboard with a chrome appearance that is airbrushed with transparent green.

(6). Prior to applying the base layer, we tape off the periscopes with carefully cut masks.

(7). After applying the base paint we remove the masks to check if we need to correct any mistakes.

(8). Finally, in the weathering phase we can apply some effects that match the general look of the vehicle.





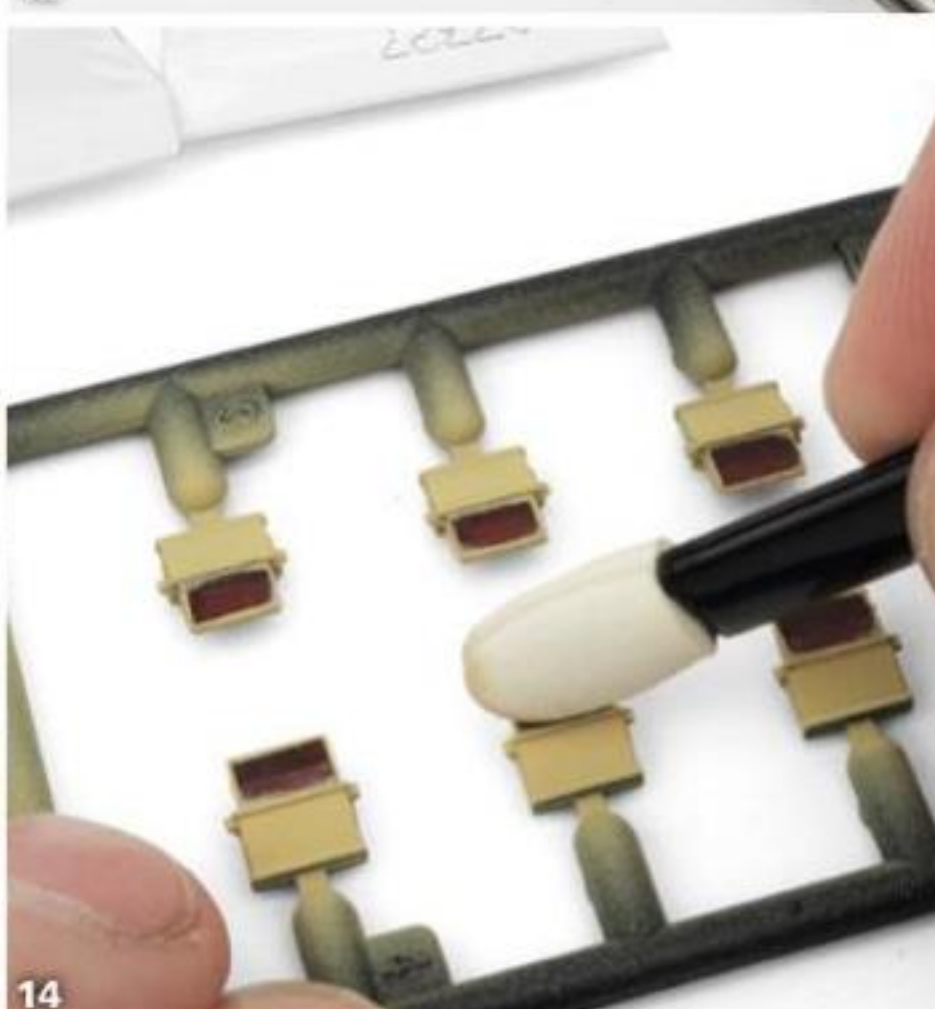
(9). The easiest way to represent periscope glasses, when they are not included in the model kit, is with a piece of plasticard.

(10). After painting the basecoat of the model and before the weathering process the glasses are painted in dark gray or black acrylics, adding a final coat of gloss varnish.



(11). After they are 'blended in' through the weathering process they have a much more satisfactory look.

(12). In some cases the kit manufacturer supplies periscopes as clear parts. Here we start with painting the entire part with transparent lacquer paint. Next we mask the periscope glasses with tape. Finally we airbrush a layer of the right colour on the entire periscope. When we remove the mask we can check whether the result is satisfactory

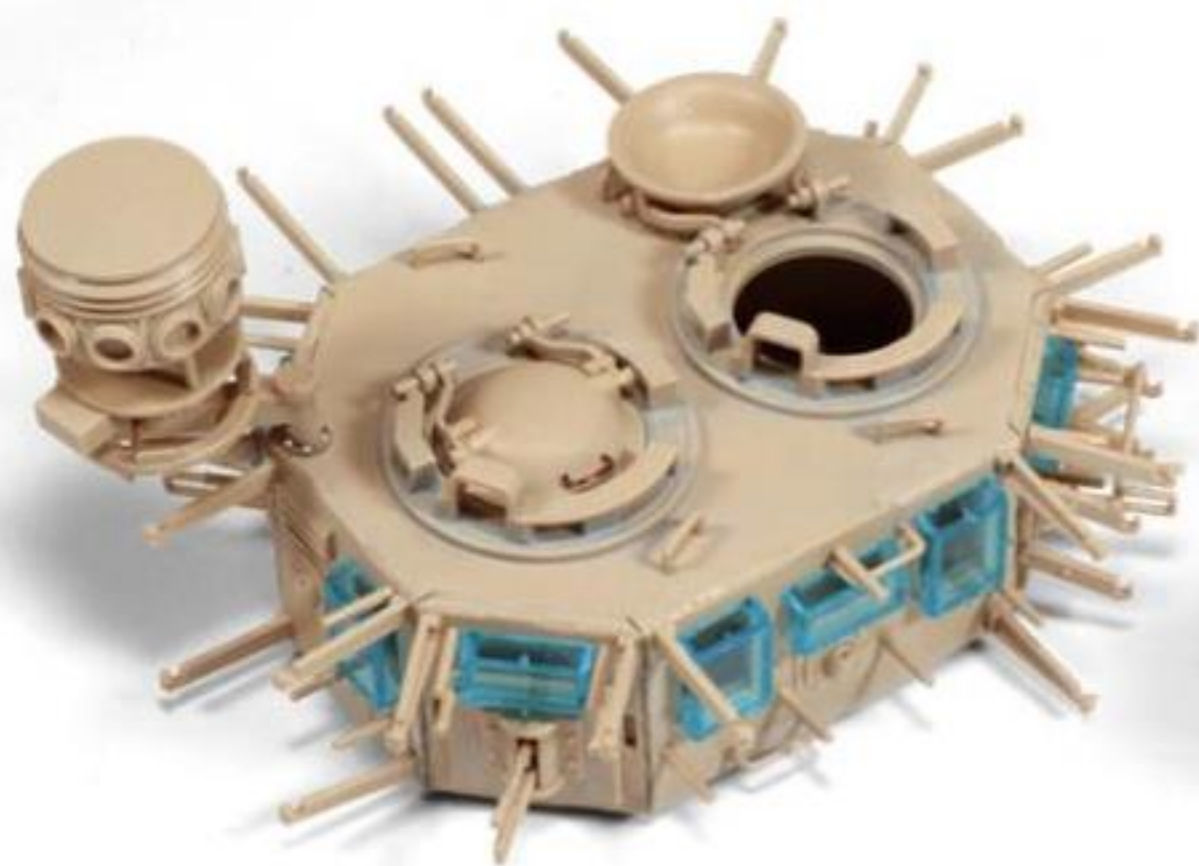


(13). Colour-wise they are further integrated with some oil washes.

(14). And finally we remove the excess paint and oils with a cotton swab.

(15). The resulting periscope, once placed on this Bradley, looks completely real.





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(16). The armoured glass on the turret of this Nagmachon is supplied as individual, tinted plastic parts. The only thing we need to do here is mask them after installation.

(17). To protect them we have used a liquid mask, easy to use, but inaccurate on the edges. However, the mask is ideal as a filler when combined with tape.



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In this case, after placing them we airbrush a layer of dust ...

... removing part of the layer with a brush moistened in the proper diluent.

The appearance, again, is unbeatable.

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Glasses

(1). You have to be especially careful with clear parts as they are prone to scratches and they will crack if we apply too much pressure. We cut them from the sprue, removing the maximum of plastic with a blade, and we sand the burrs with sandpaper.

(2). To dye them we must airbrush heavily thinned paint and in thin layers, so as not to flood the surface, using 20% paint and 80% thinner.

(3). The edges should be painted, often in black rubber or in the same base colour as the vehicle. In this case, NATO Green.

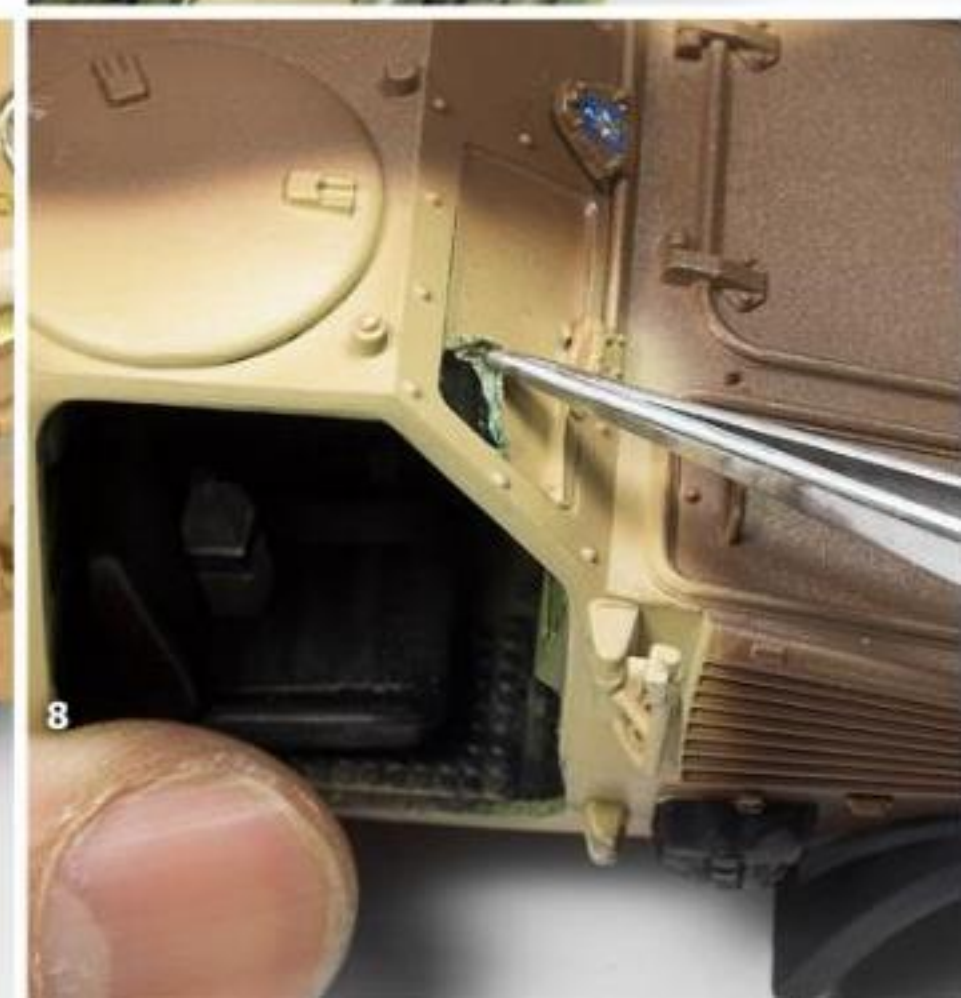
(4). Next, we remove the clear parts from the sprue with a sharp blade leaving the least amount of sprue. We sand again and retouch if necessary.

(5). It is important to check which parts will be visible through the glasses and to paint them in the right colour.

(6). The clear parts are glued with a just small amount of glue and never touching the central area. We can use adhesive for plastic, cyanoacrylate or white glue.

(7). The best solution is to use liquid mask to protect these glasses, using a wooden stick or a fine brush.

(8). Once the painting process is finished, we remove the liquid mask with the help of tweezers.





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(9). To depict the traces of the wipers we can use masking tape or commercial masks that can be adapted to multitude of vehicles. We will have to be careful and precise at the time to do this task.

(10). Once the masks are properly in place, we apply dry pigments or airbrush a mist of earth-coloured paint.



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(11). After we have carefully removed the masks we can observe the result. We can correct, if necessary, with a brush, slightly moistened with thinner, or with a toothpick.

(12). An eye-catching effect and something very easy to achieve, are surfaces that are partially cleaned by the crew.

(13). Another way to get the dusty effect on a windshield is to airbrush matt varnish after having masked them properly. The matting effect of the varnish applied on a transparent surface produces the effect that is observed in the picture. It makes the glass opaque and simulates dust and accumulated dirt.



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(14). To close this chapter we will show how a dusty windshield can be simulated, with realistic effect, in a very simple way. One part is to simulate a cleaning carried out with a cloth, removing only the dirt from the central part of the glass. For this we will rub with a cotton swab soaked in thinner. (See the side windows) Another part is to use a toothpick to add all kinds of stripes and scratches on the dirty part of the surface, to simulate various scratches produced by the crew or others elements. (See front windshield).



II.1.9.

INTERIORS AND ENGINES

The build of a model very often starts with the interior and the engine. Not all manufacturers include these parts, and if they do, often merely a representative part, sometimes limited to the area around the hatches, driving position or engine compartment. We have to work on them before we close the two halves of the model. In the best case it will involve building and painting these areas or parts

around the doors, hatches and other openings. In other cases we may decide to use an improvement set and this will involve some extra work. Often we will have to add the wiring and some omitted parts. Concerning interiors, the work will be more or less complex if we want to improve the dashboard, belts and other details. Let's have a look at a couple of examples.

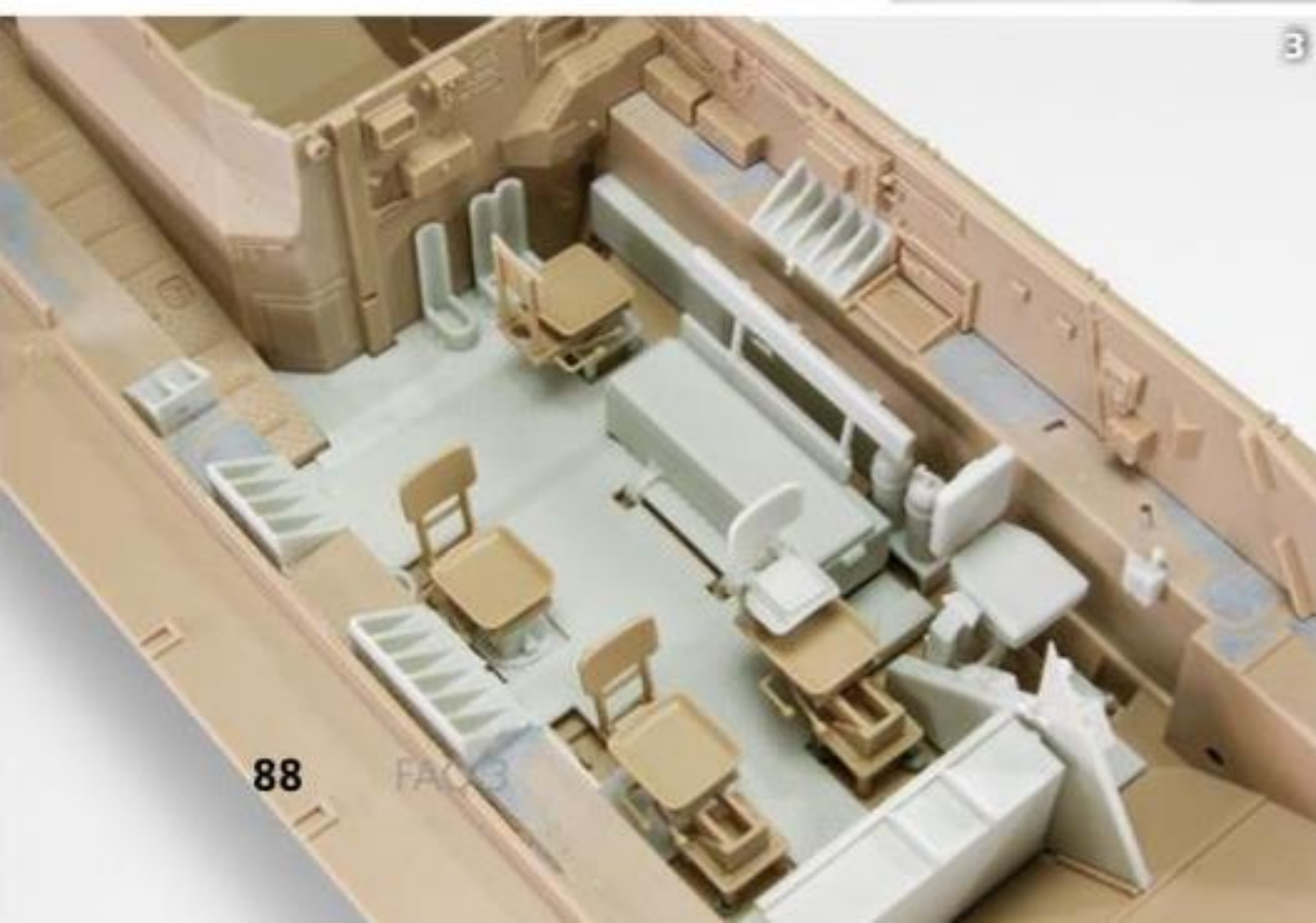
Interiors

(1). Real photo

(2). Identifying interior parts is easy. Apart from describing them in the instruction sheets manufacturers often inject them in a different colour plastic. The building process is no different from other parts of the model. We will use the same tools and supplies and we will pay the same attention to burrs, joints and the overall finish.

(3). After checking the fit of each block or set separately, we check for final adjustments without glueing anything. We want the painting process be as comfortable as possible. Once painted and weathered, all the elements will be glued in their final and correct position.

(4). Painting interiors always involves working in subassemblies, for greater comfort. We start by airbrushing all the parts in their corresponding base colours.





(5). After painting all the parts and subassemblies, we have to place the decals and/or paint the instrument panels prior to the next weathering phase.

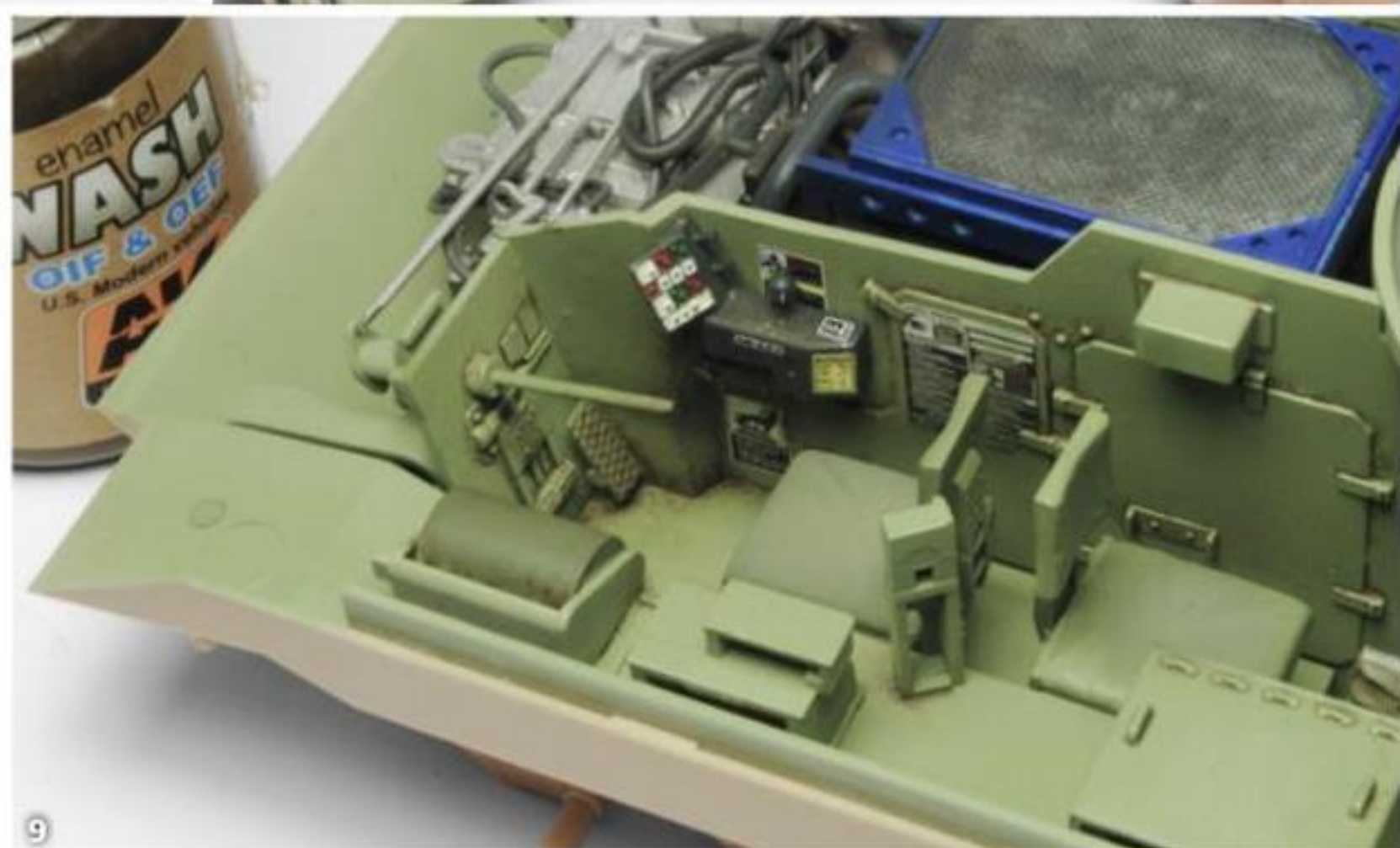
(6). Once the previous phase is finished, we start weathering using the available products. Each product creates its own desired effect.

(7). After conveniently applying filters, washes and oil paint to obtain depth, we apply some pigments and enamels for dust, earth or mud effects, to add the final touch in relation to the exterior look.

(8). Next we polish certain metal parts to represent wear from continuous friction.

(9). Bit by bit the interior is completed with an increasingly realistic aspect.

(10). If it is necessary to add wiring, pipes or any other detail we will do this prior to the weathering process, using all kinds of thin wire and elastic rubber to imitate the conduits. Fasteners are created using tin foil.





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After the installation of the wiring we proceed to apply the weathering in the same way as the rest of the interior.



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Safety belts are elements that add great realism. On this occasion we have detailed the ones included by the manufacturer with a small piece of masking tape.



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(13). Like many other accessories, once installed, all extras are very eye-catching.

(14). Overall look of the completely finished interior of this Bradley. We have to carefully protect the interior before starting the exterior painting.

(15). If seatbelts are not included it's easy to add them using masking tape. Tape easily folds and you can cut thin strips of the proper width.

(16). Then just cut the strips to the appropriate length and add the restraining harnesses and buckles.

(17). Another way to make belts is using flexible plastic tape. This can be found in 1/24 or 1/32 scale civilian vehicle



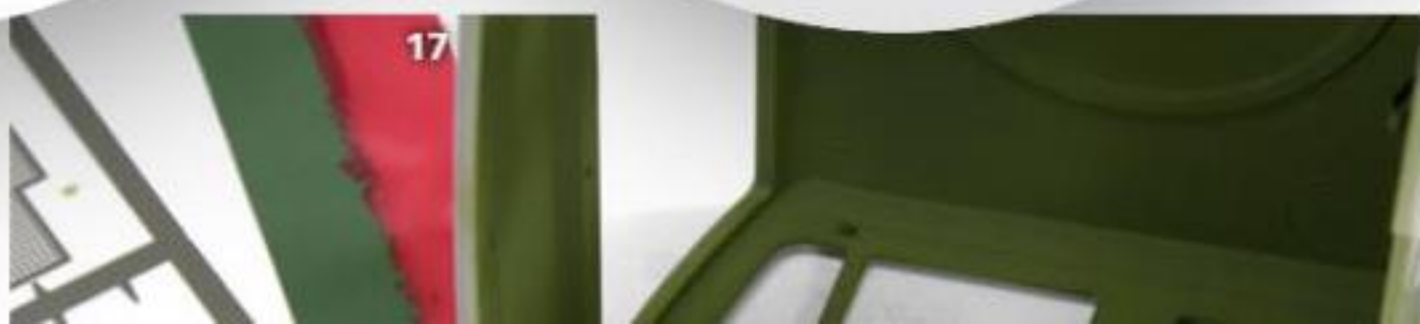
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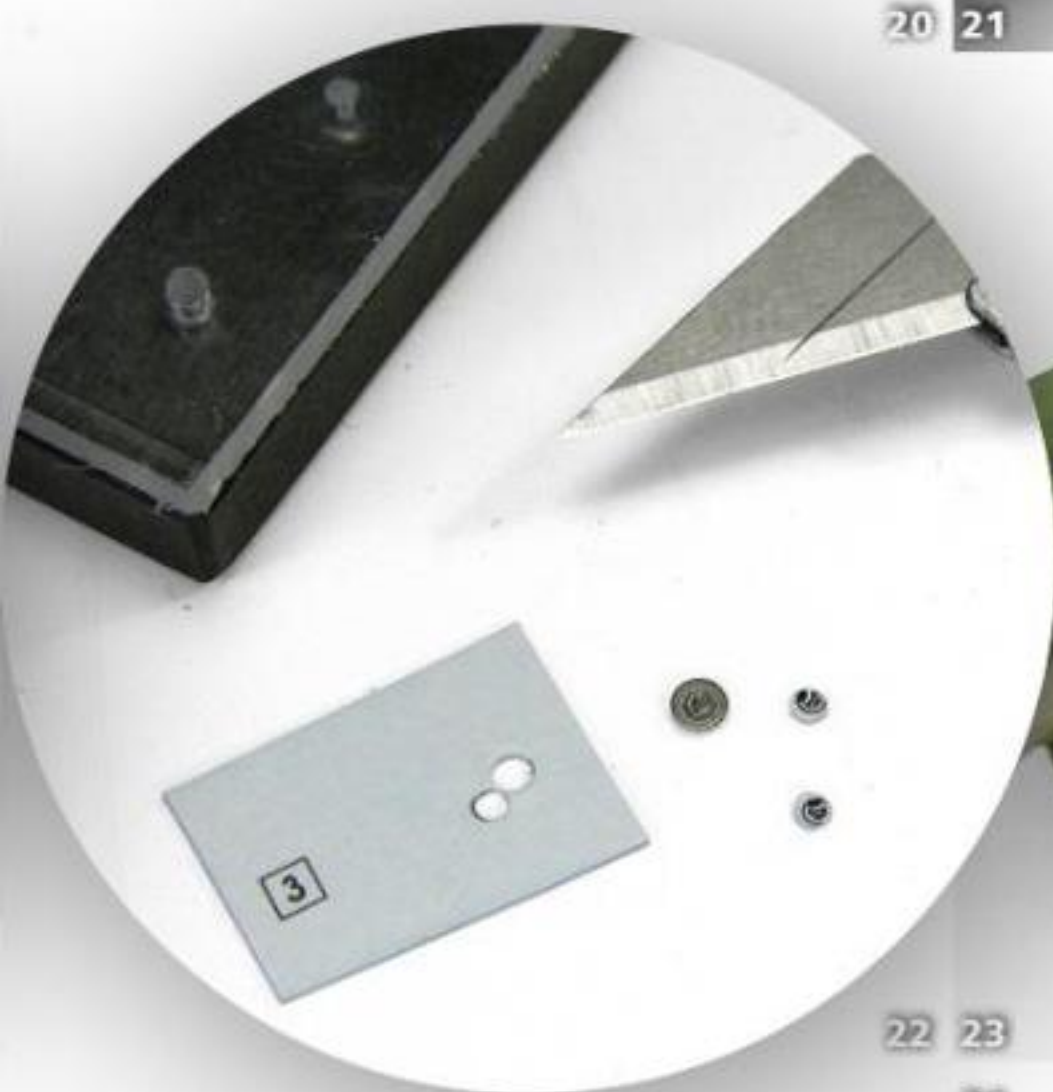




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(18). We have added plastic sheet floor mats from a 1/24 scale civil model.

(19). Very often small details such as buttons or indicators have been omitted from the instrument panel. We can add these using some plastic sheet and a punch or knife. We have also added the fastenings belts.

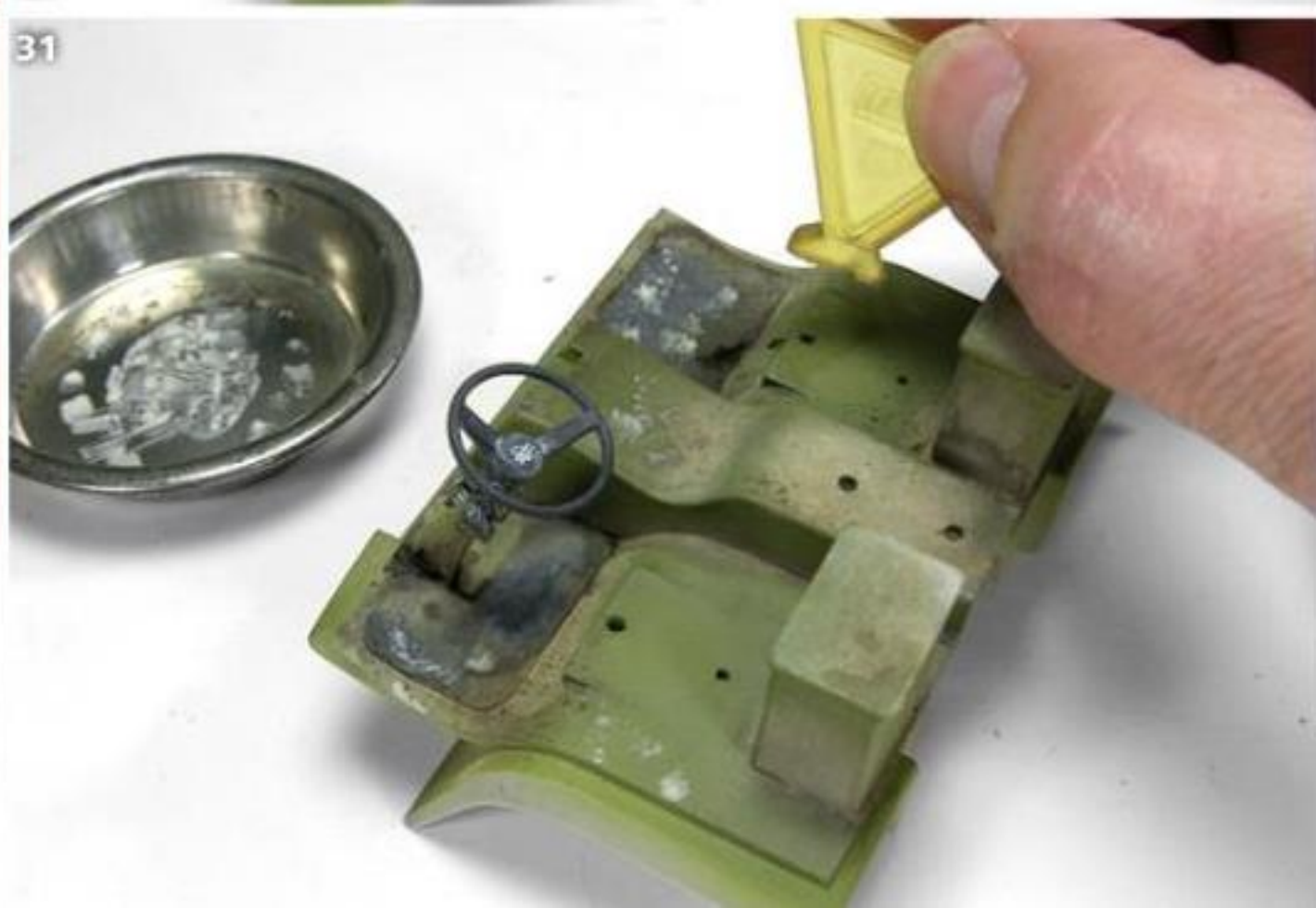
(20). All the elements of the dashboard are painted using real references. Once painted we begin to place the various gauges and details with decals both included in the kit and coming from our spares box.

(21). You can punch out decals from the decal sheet with the "Punch and Die".

(22). With the right punch we collect the necessary dials. They can also come from sources other than the decals of the actual model kit.

(23). Use a bit of white glue diluted with water, or even an acrylic varnish to fix them.

(24). Once the dials and decals have been added we paint the push buttons with acrylics. We should add a droplet of gloss varnish.





32 33



(25). First we apply a dark brown wash, a mix of oil and enamel paints, in all corners and nooks.

(26). After a few minutes we remove the excess with a clean brush and a thinner such as White Spirit.

(27). Next, with diluted earth oil colours we apply dust effects.

(28). Once the oils are applied, it is time to apply some pigments. After making our selection we apply them dry with a small brush. Make sure not to exaggerate.

(29). Then rub the area.

(30). To represent different liquid spills we use AK025 Fuel Stains mixed with oil, Abt015 Shadow Brown, diluted with White Spirit. With this mixture we also add some small splashes.

(31). Finally, we can add some footprints with a special tool and some enamels.

(32). The interior is completed.

(33). The belts and door handles are also very realistic.

(34,35). After adding some stowage the look of the interior has improved considerably. Now we can close and assemble the cab of this truck.



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Engines

Nowadays there are many models that include both the engine and the engine bay, nicely detailed. In that case we just have to apply the different colours according to the manufacturer's instructions or our own reference pictures.

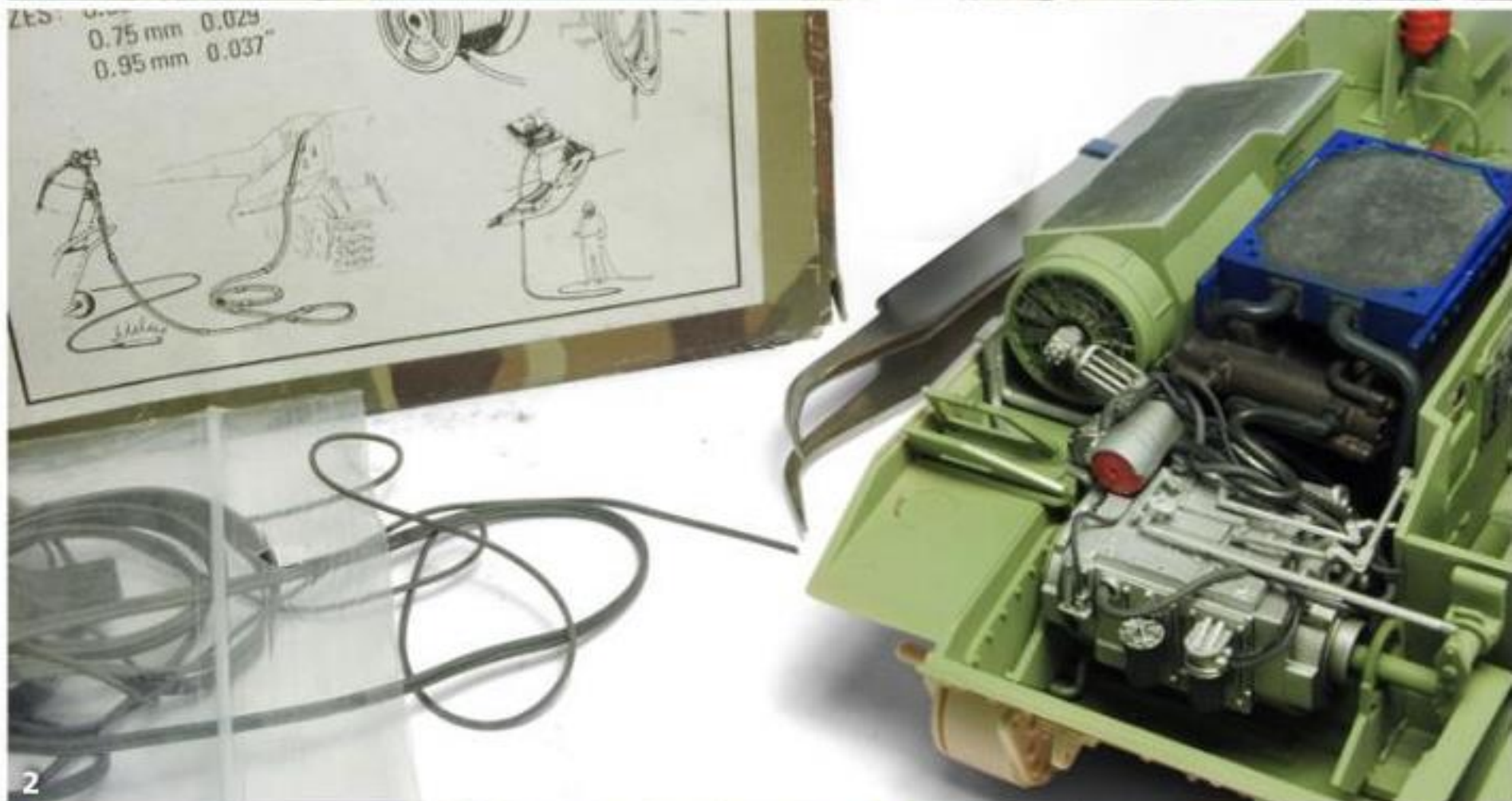
(1). Real photo.

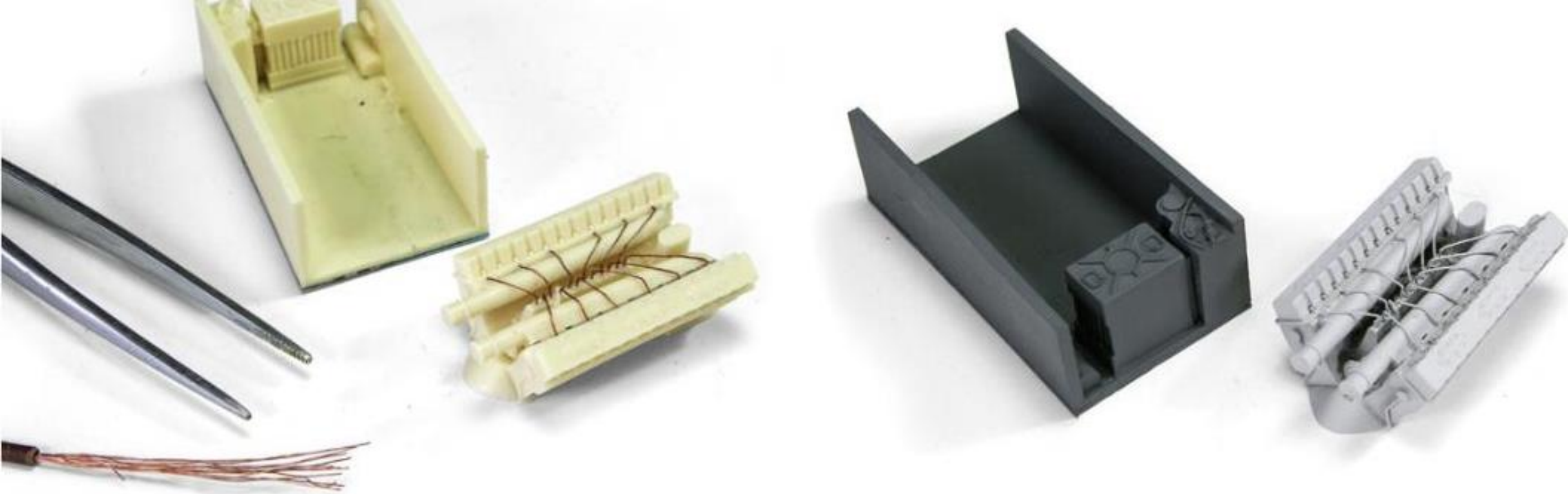
(2). Modern engines are usually full of tubes and wiring that we can imitate with flexible rubber tube.

(3). Once the conduits are fixed with cyano we can touch up the glue spots with some paint.

(4). As a final step we just need to imitate the dirt that is concentrated on the engine, using washes and wet effects to simulate the grease and the fuel stains.

(5). Once the work is finished, we can close the model and continue with the build.





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(6). Often we can add small improvements that can be seen through the hatches. It's enough to detail the area that is visible to get a pretty good result. Sometimes this improvement consists of adding some wiring with copper wire.

(7). Once these simple modifications are done we paint the engine, adding some wear and tear. The compartment is painted in a very dark gray and the engine block in a light gray that also acts as a primer, especially for the metal wiring.

(8). The first step is to airbrush AK088 Worn Effects to obtain various chipping effects.

(9). While drying we apply a wash on the engine compartment with medium grey acrylic paint.

(10). Once the liquid has dried we airbrush a green tone on the engine block so we can start chipping.



10 11

(11). We rub the surface with a brush moistened with water, removing the paint.

(12). Then we apply chipping with rust-coloured acrylics, both with a brush and with a sponge. Some parts of the engines are made of alloys that don't rust so the use of accurate documentation is essential.



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(13). Apply a dark brown wash to both the engine and the engine compartment to add more depth...

(14). ... removing the excess with White Spirit and a brush.

(15). We can take advantage of the wash and reproduce a dirty streaking grime effect by sweeping off the excess with vertical sweeps.

(16). Partial view of the work done on the compartment and engine with the various wear and tear effects.

(17). Randomly apply dry pigments.

(18). Another advantage of the pigments is that they offer an ideal basecoat for all kinds of stains that become more apparent on this background. We splash on the stains with the help of a toothpick,

(19). ... or the tip of a brush.

(20.21). On the engine block we used AK025 Fuel Stains to depict oil leaks and fuel.

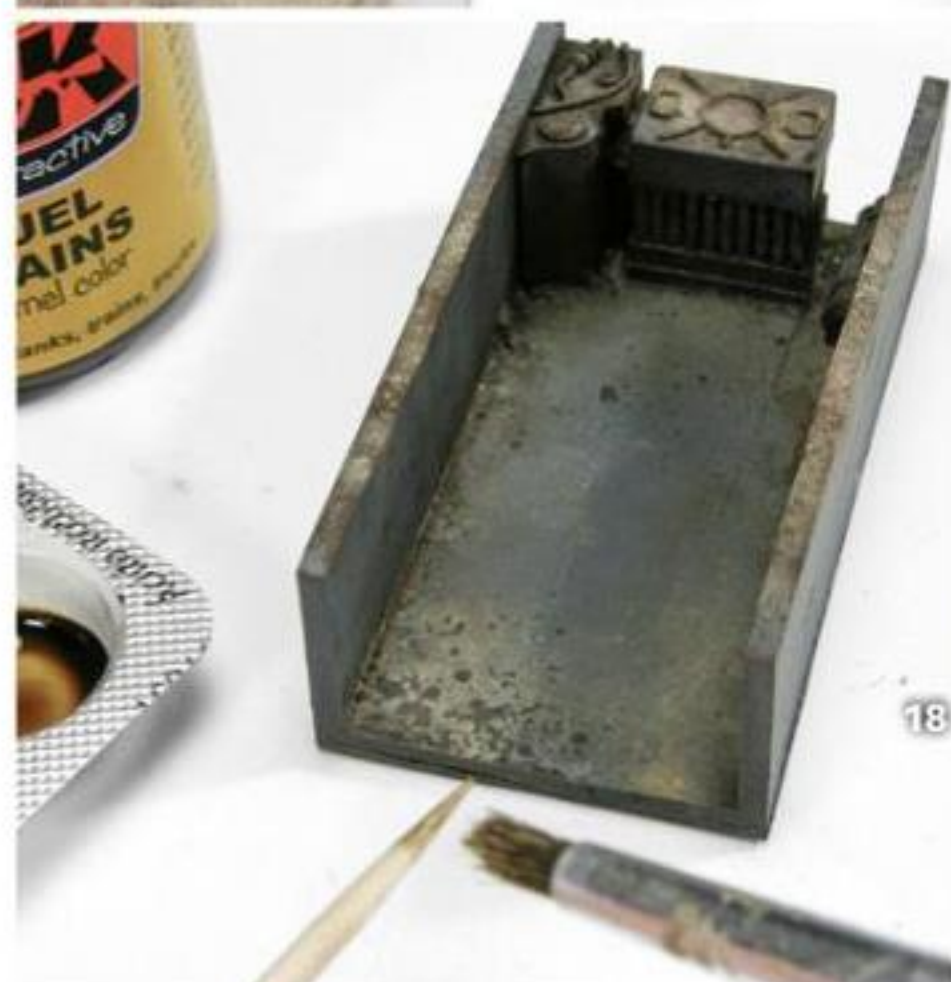
(22). We finish the work with small splashes on the upper areas.



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II. TECHNIQUES



CHAP.: 2



Textures and anti-slip surfaces

When we look at combat vehicles we often notice the rough surface of some of their parts. This is because of the type of raw materials that were used, but also because of the manufacturing process.

Modern combat vehicles very often have an anti-slip surface to improve the grip for the crew. This is another aspect we must take into account.

During the assembly phase we should consider adding or modifying certain surfaces of the model. Some of them require texture, others the addition of anti-slip surfaces.

In this chapter we will see how to add these small changes. They will also have a decisive impact on the painting process and the further weathering of our models.

II.2.1. TEXTURES

We can use different materials to obtain texture on the plastic. These are all simple to apply and yield fast and satisfactory results. Perhaps the most complicated task is to find a good reference picture to base our work on.

Nowadays we are not limited to the typical putty that can be dissolved with acetone. There is a whole range of products for obtaining texture on any material and depicting a certain finish of the object.

Using a mini-drill

(1). When you have a mini-drill, texture can be obtained using a whole range of accessories such as milling discs, burs, grinding wheels,... These allow us to attack the plastic and create all kinds of rough effects with relative ease.

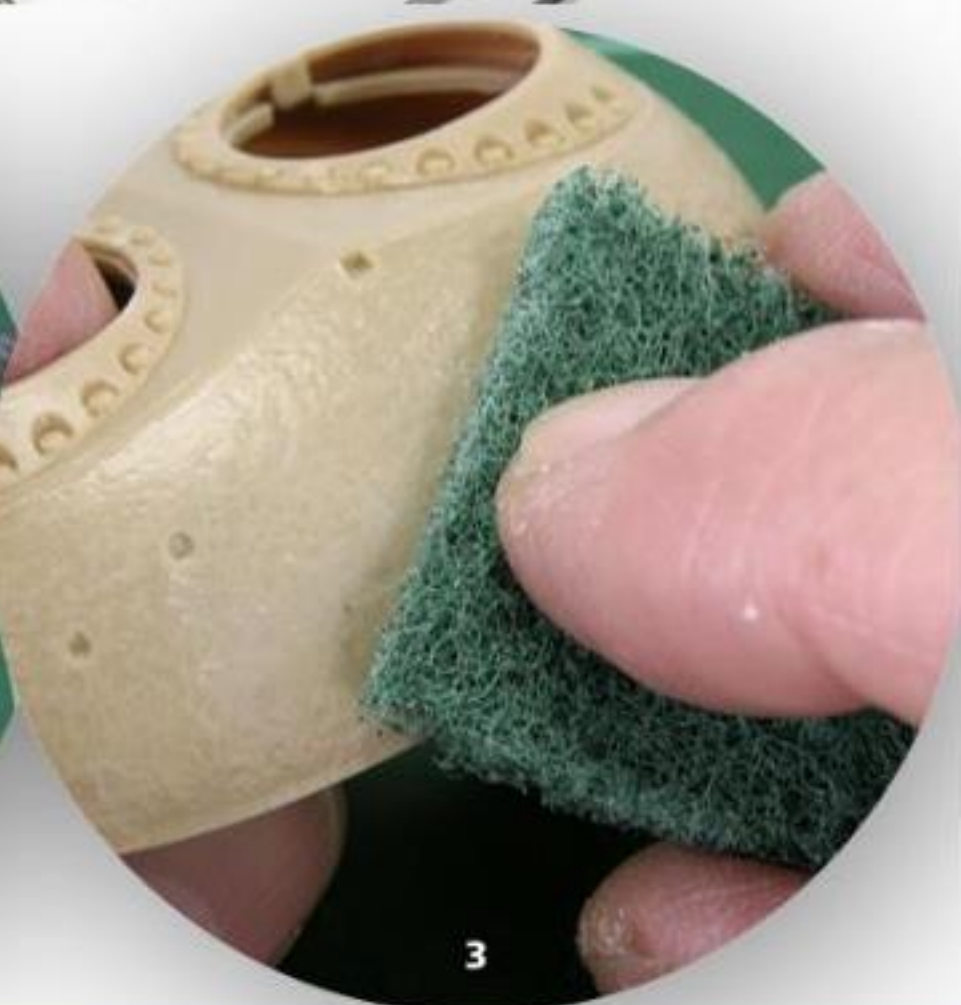
(2). With a spherical bur we reproduce all kinds of defects, gaps and marks in a random way. Be cautious and run the drill at low speed, otherwise you will melt the plastic.

(3). Remove the remains of plastic by rubbing the surface with an abrasive sponge.

(4). We test other types of tools to produce different types of marks and to increase the depth of the obtained texture.

(5). As a final step we gently apply fine sandpaper to smooth the surface and to soften the effect of the milling bur.

(6). The end result will be surface with the desired roughness, really changing the look of our model.



Using liquid glue

(1). Another easy method to add texture is applying liquid adhesive with a stiff bristle brush.

(2). Liquid plastic glue makes the plastic melt. We start by covering the surface on which we want to obtain the texture.

(3). After a few seconds, when poking the brush, we observe that the plastic begins to soften.

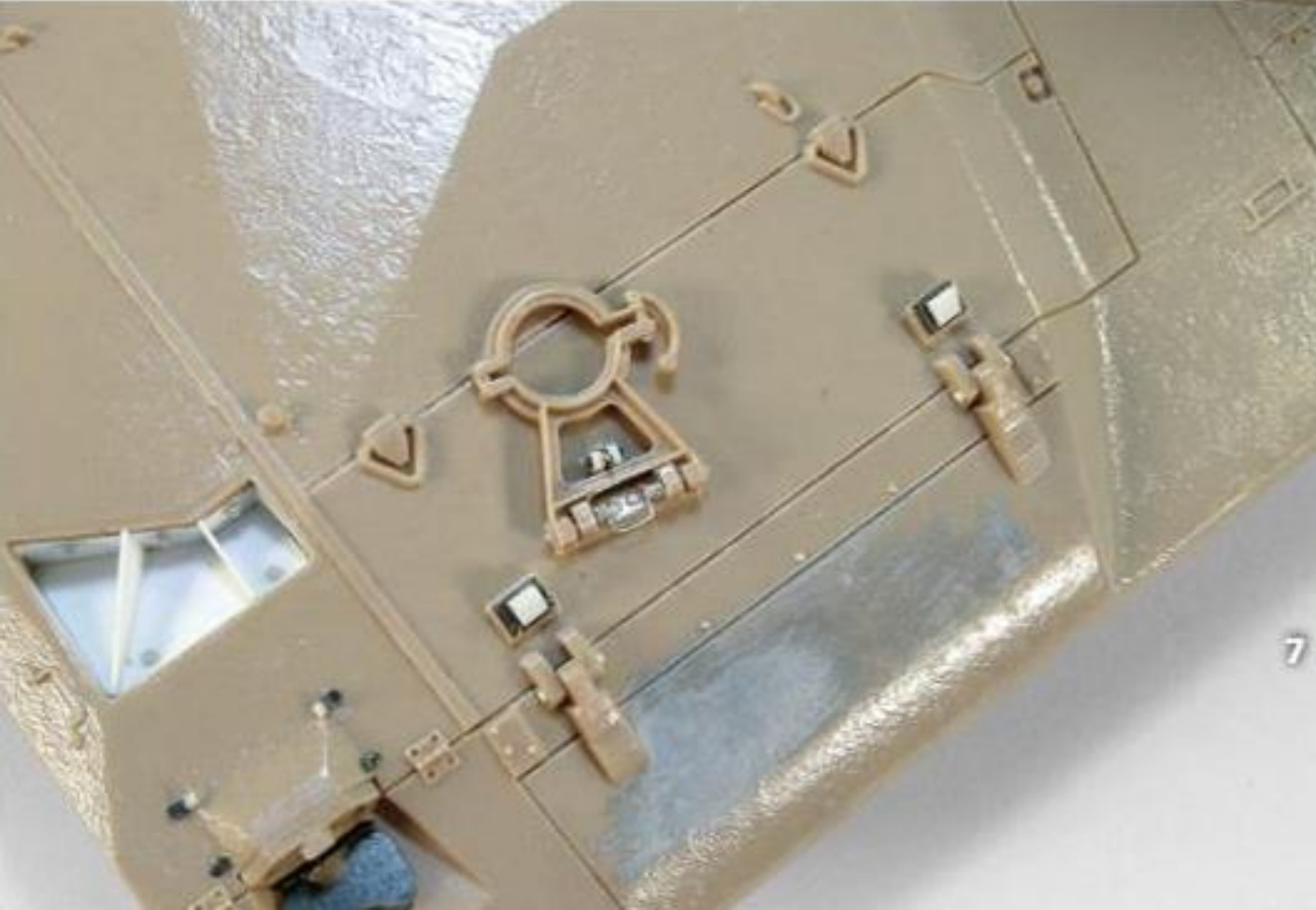
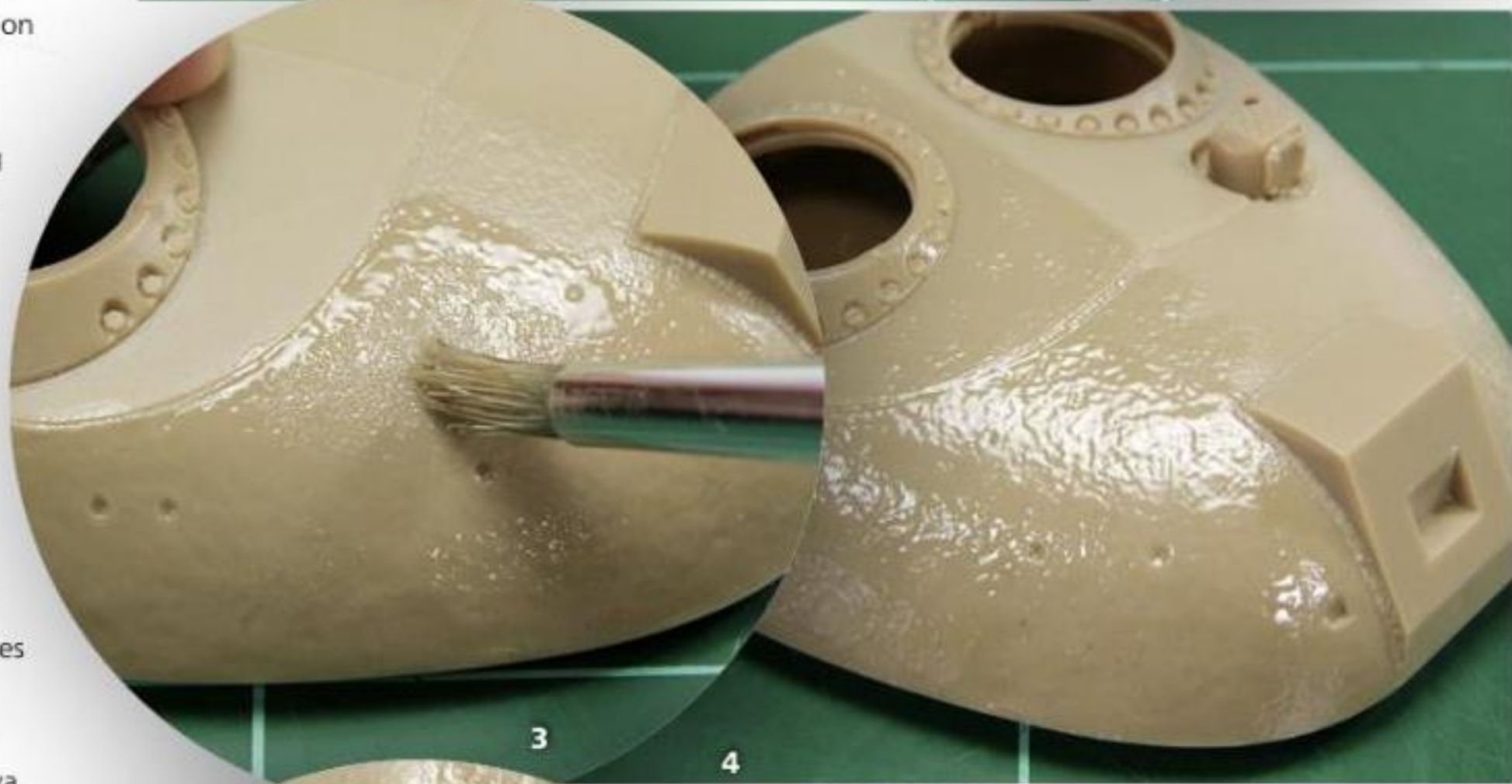
(4). While the adhesive is still wet we can repeat the process adding more adhesive and as a result the plastic melts a bit more obtaining a greater texture.

(5). We can clearly see the difference between the textured and smooth sides of the turret.

(6). On the flat surfaces of this Merkava Mk.I we can clearly appreciate the effect of the application of the liquid adhesive.

(7). This is a quick, simple method and comfortable enough to get some texture and roughness on the plastic.

(8). Note the difference between the textured turret and the rear hatches on which the adhesive has not been applied. This play with texture allows you to get different finishes when you start painting and weathering.

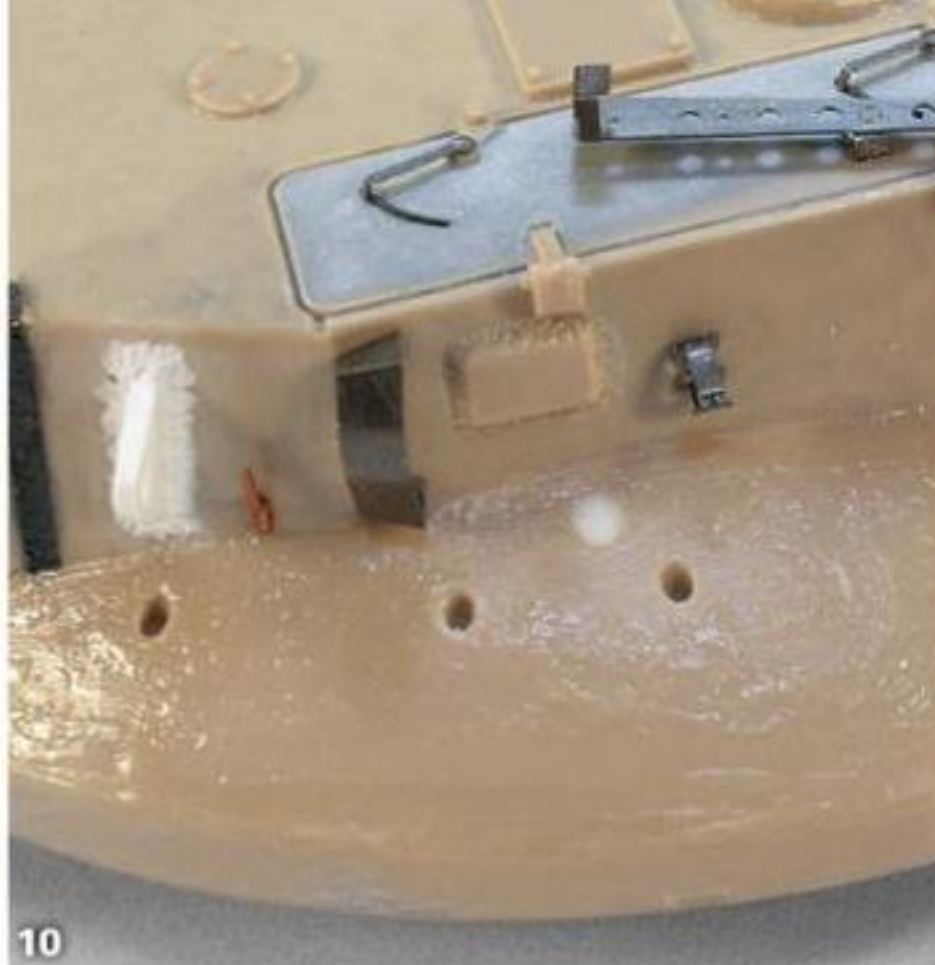
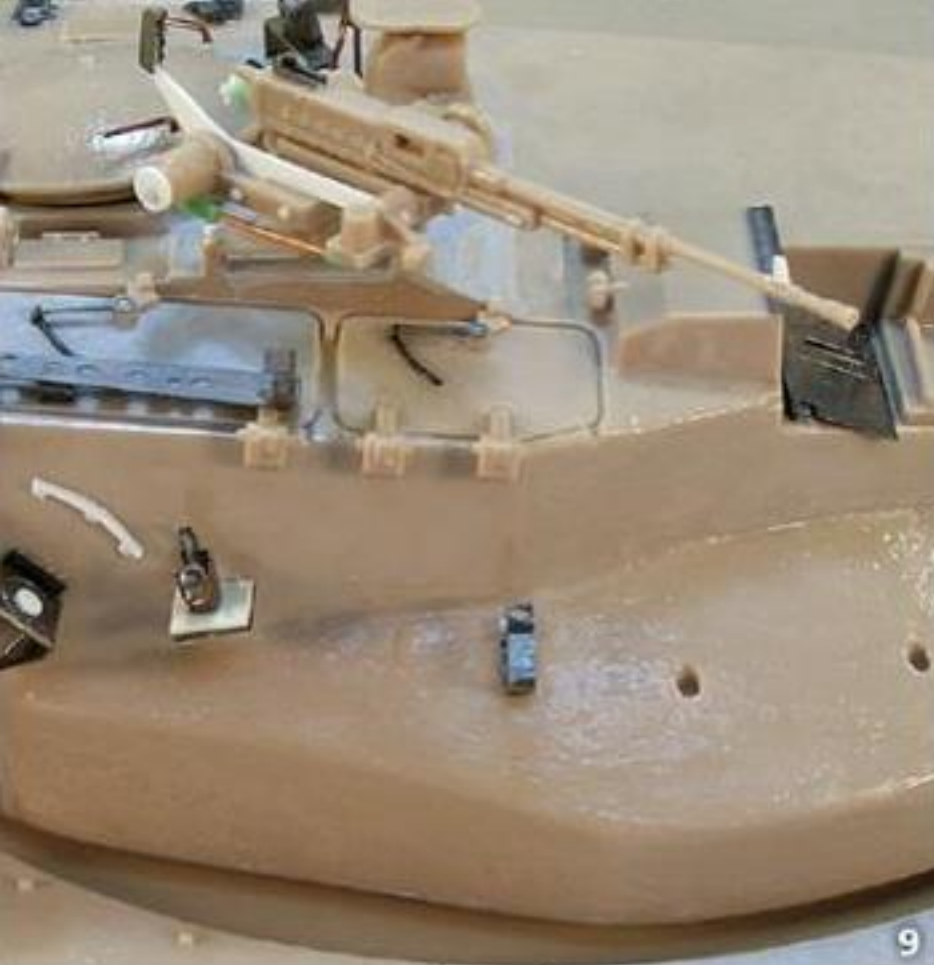


Using cyanoacrylate

(1). This method of obtaining texture is somewhat more risky but with some practice it offers an interesting result. We use cyano-type adhesive and a cloth or sponge.

(2). We apply the cyano on the surface in a random way and without covering it completely.





(3). Once the cyano is applied we wait a few seconds and then use the cloth to accelerate the drying time. We avoid creating rounded shapes.

(4). The result is a different texture than the one produced with the liquid adhesive.

(5). After we feel comfortable with the test we apply the cyano on the upper part of the turret.

(6). After waiting just a few seconds, we apply a soft sanding to avoid the rounded shapes.

(7,8). And we clearly get a quite different result.

(9,10). Check out the texture on the turret of this Merkava Mk.I, combining the technique with cyano and adhesive liquid.

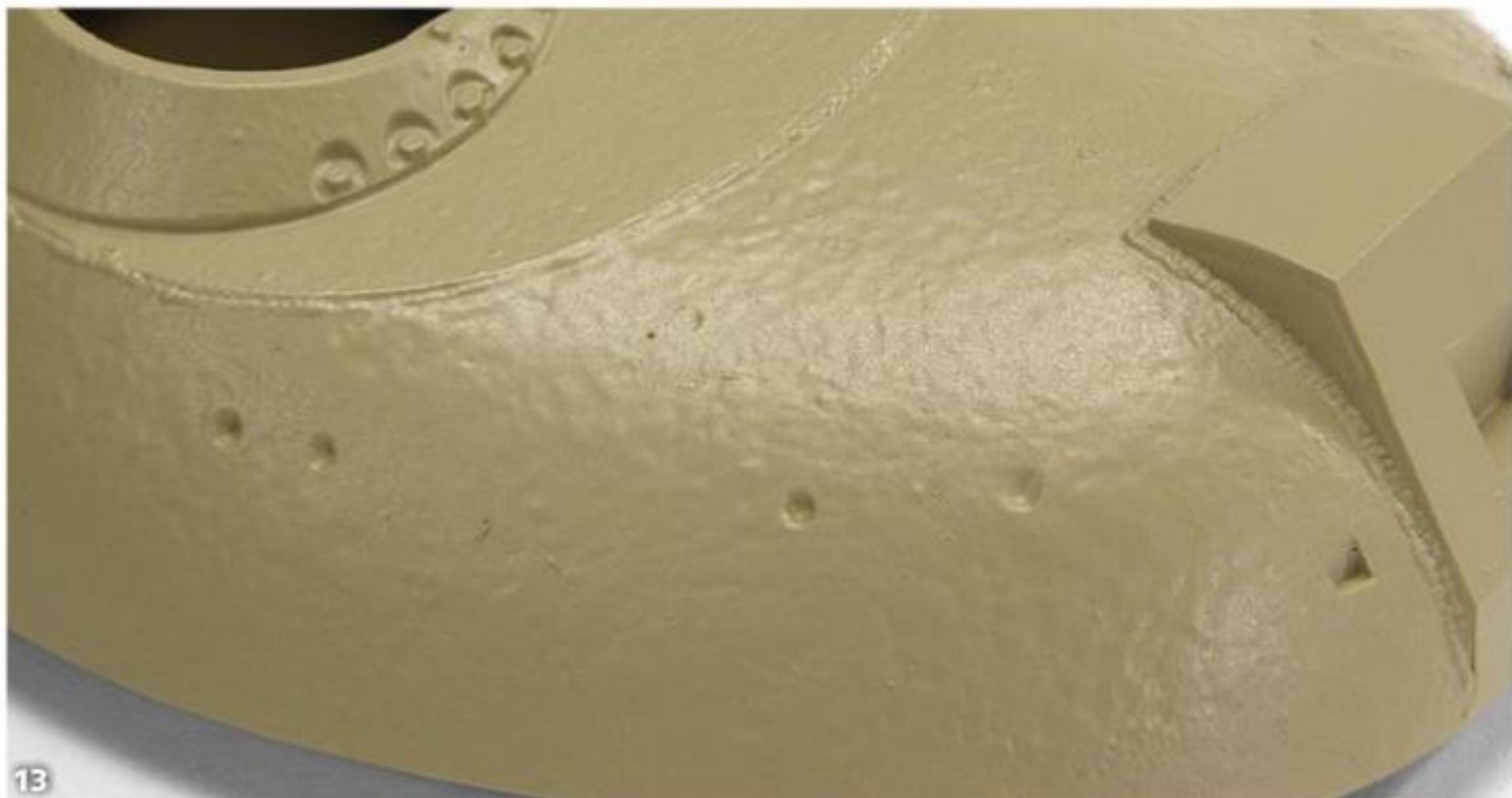
(11). Let's check the results so far by airbrushing a layer of RC097 UAE Sand Dull with a few drops of satin varnish RC501. The result of our texturing job is quite convincing after applying the paint.

(12,13,14). Thanks to these pictures we can compare the textures obtained by the three previous methods and see the difference between them, after the application of the paint.

TEXTURE WITH CIANO



TEXTURE WITH LIQUID GLUE



TEXTURE USING MINI DRILL



Using putty

(1). In the past we usually used putty to obtain texture. The most common putty was the Tamiya one. These putties were diluted with acetone and applied with a old brush, dabbing the surface that you wanted to texture.



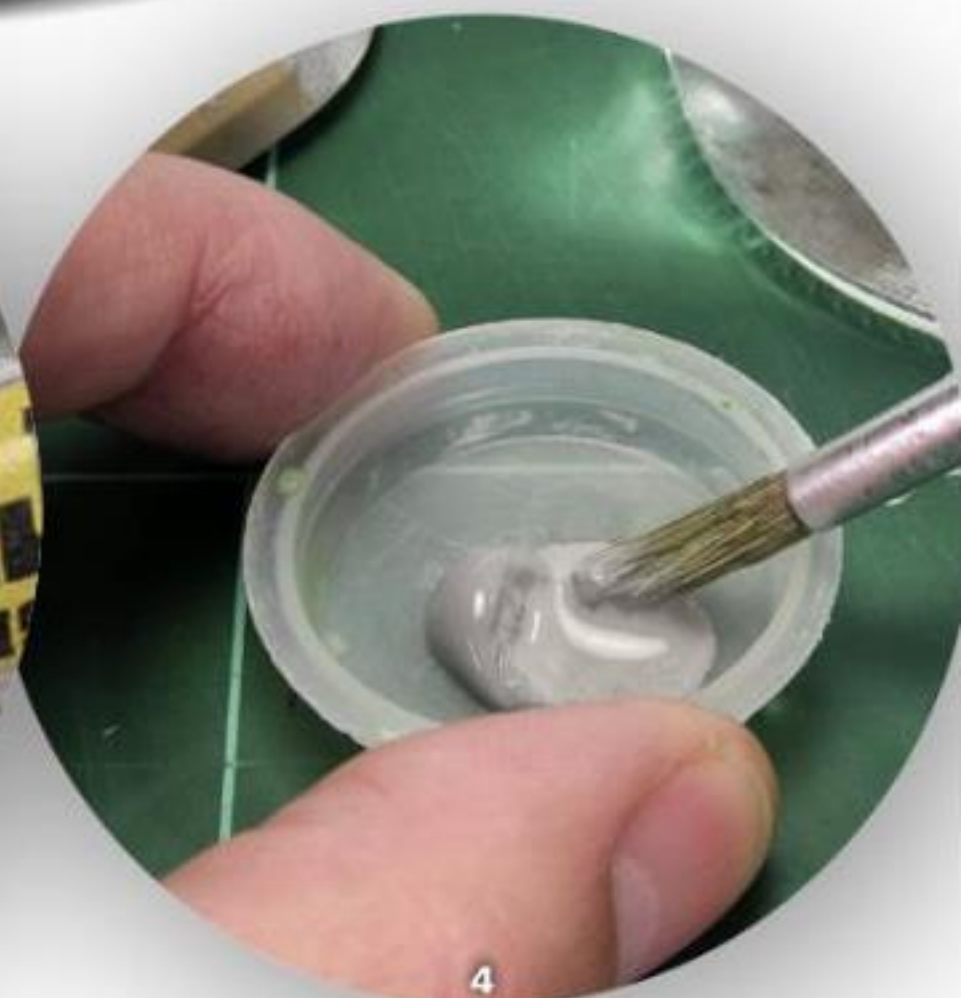
2

Nowadays several manufacturers have developed similar products, but 100% acrylic-based. Their use is much simpler by allowing water to be used as a diluent. Nonetheless they provide the same type of finish.



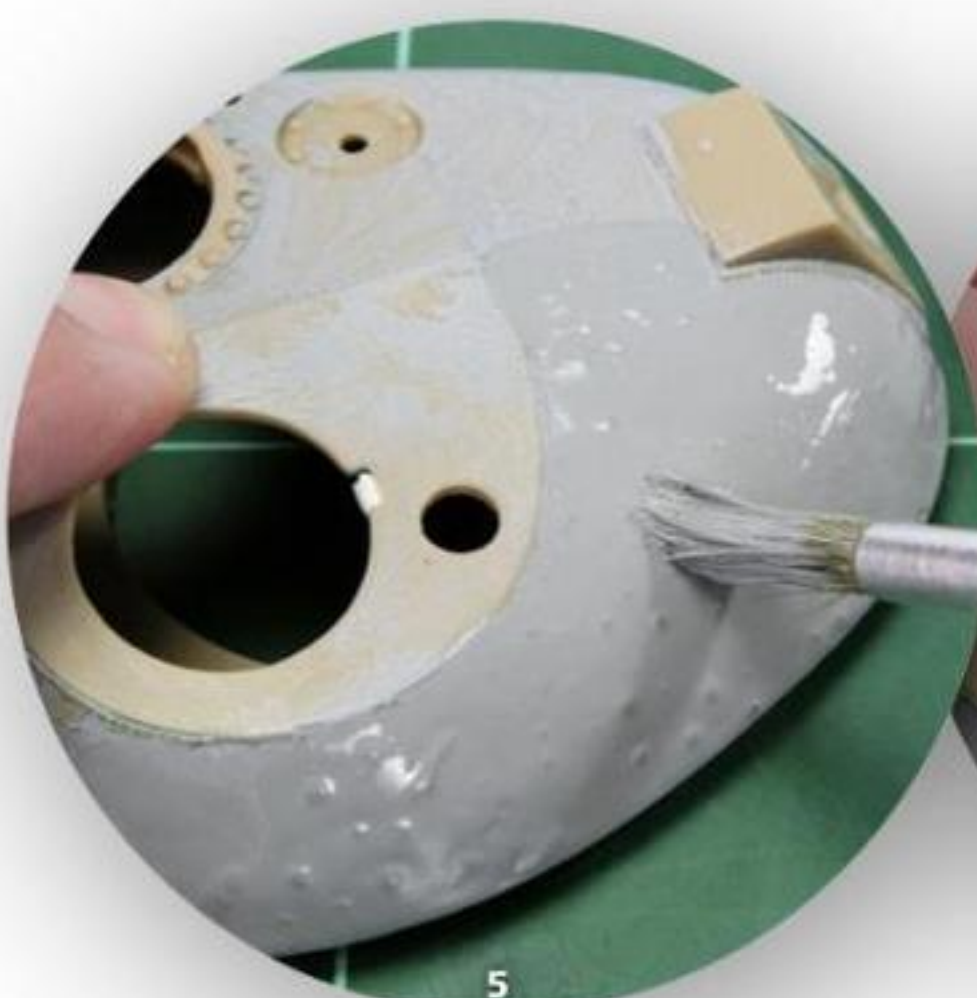
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AK104 Gray Putty is very much like Tamiya's putty. There is another reference in the AK catalog, AK103 White Putty, which is also acrylic, but with a much harder finish and more resistant.



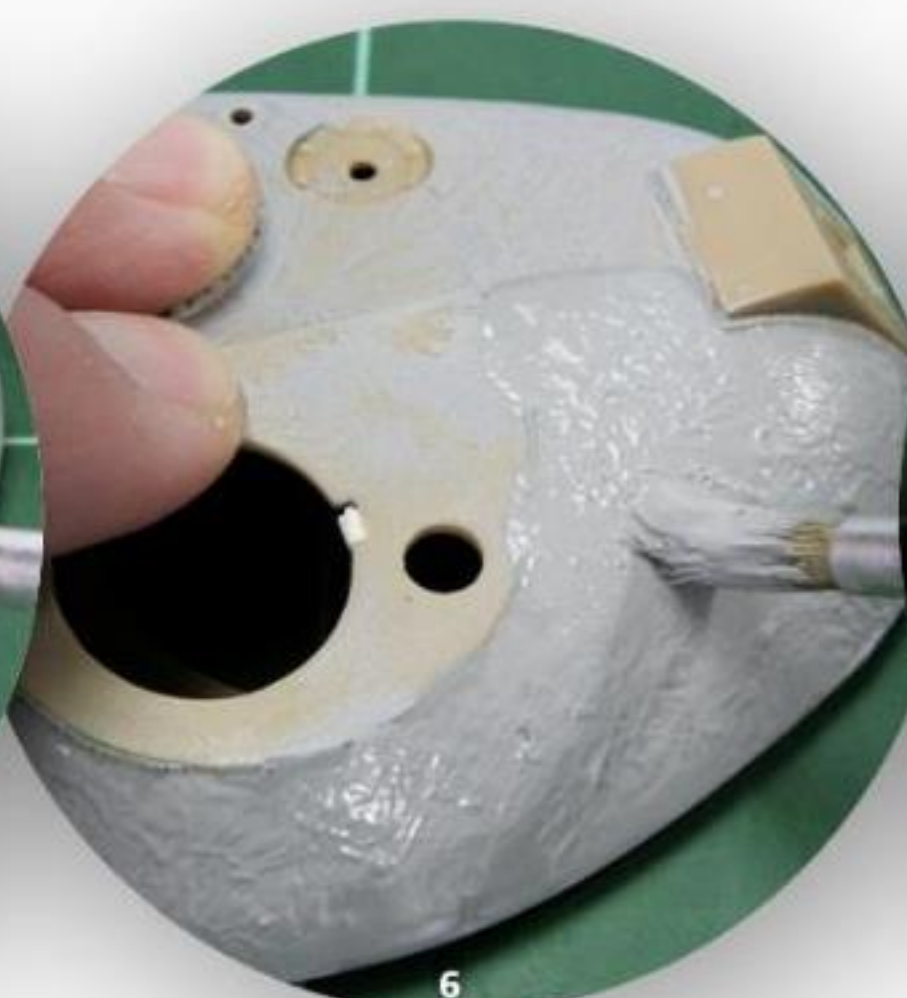
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We use a small container to mix the putty with water.



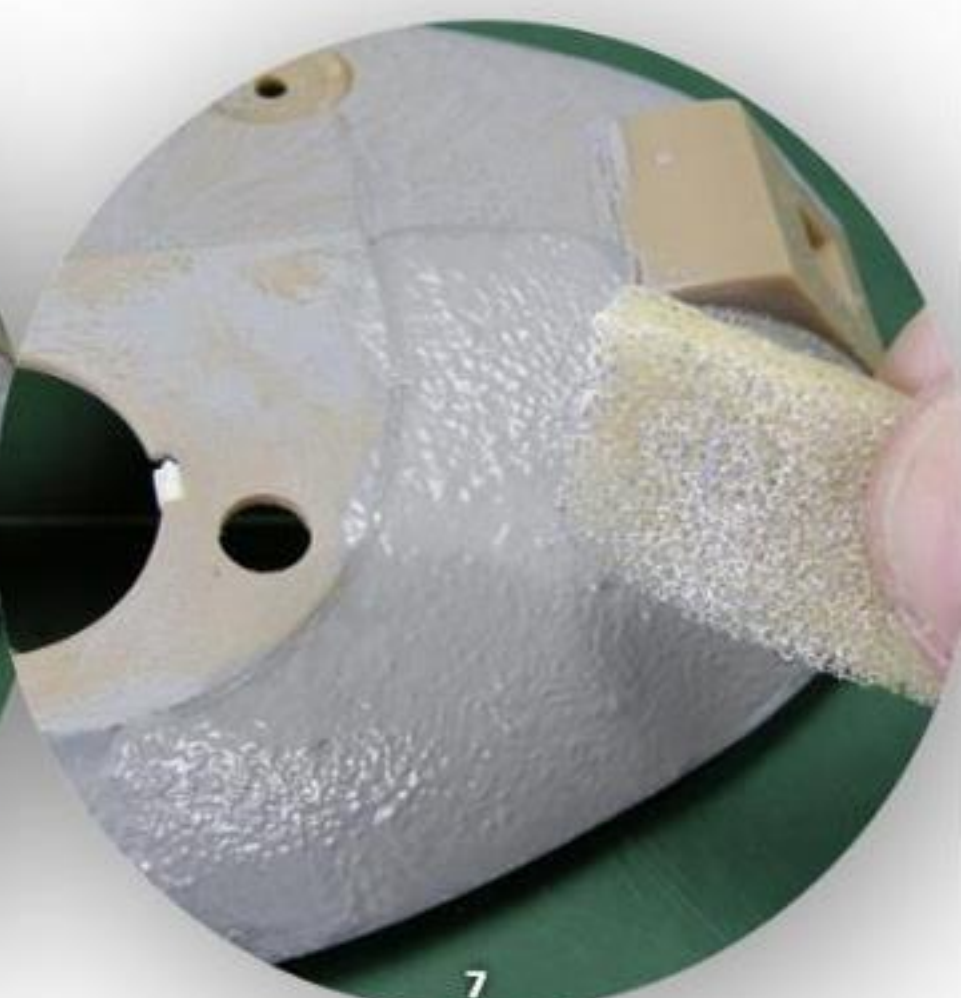
5

Once diluted we can start texturing, in the same way as we did before, with a hard bristle brush dabbing the surface.



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Once the first layer is applied, and we don't even have to wait for it to dry, we can apply a second less diluted layer, straight from the tube.



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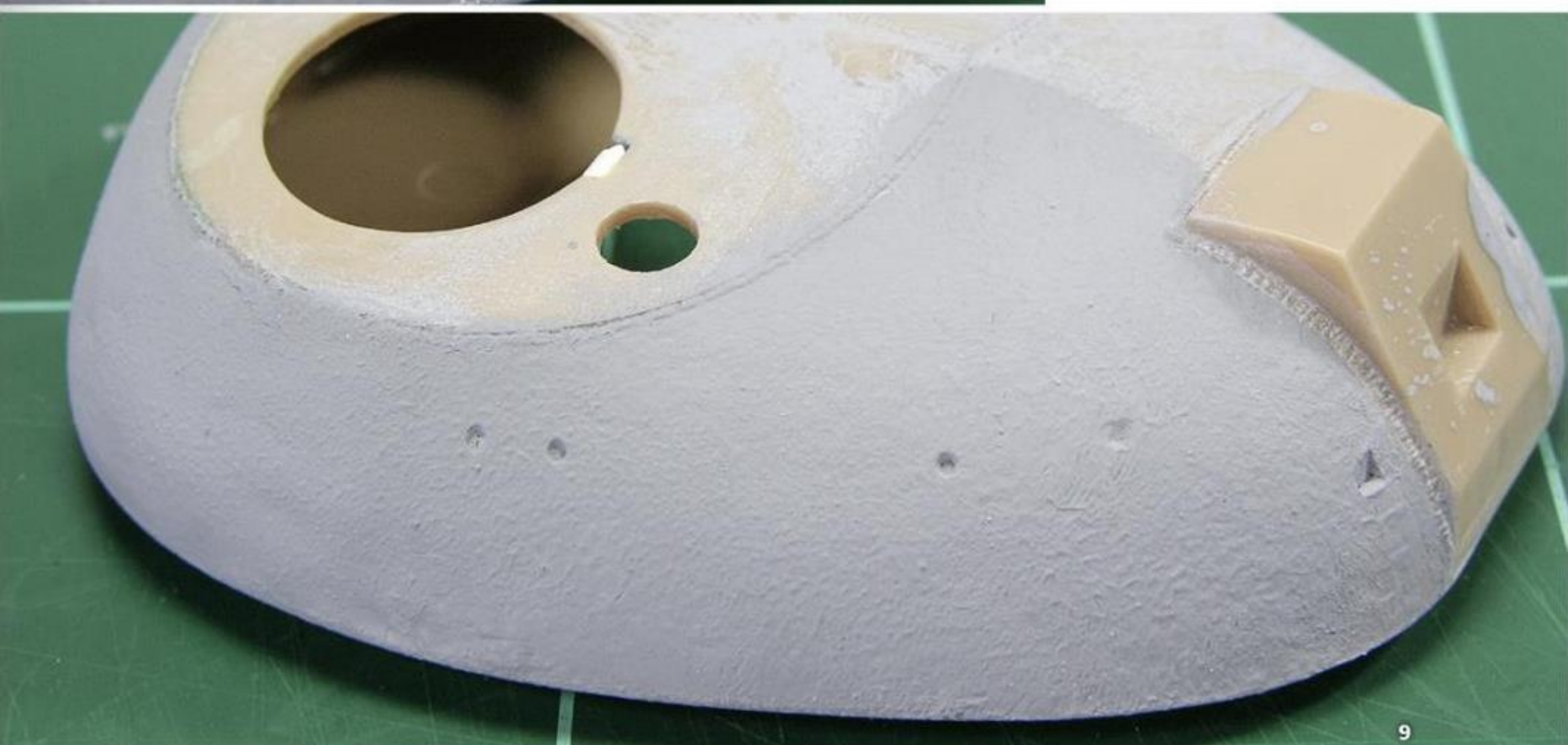
Use a soft sponge to remove the bubbles, although they will also disappear when completely dry.



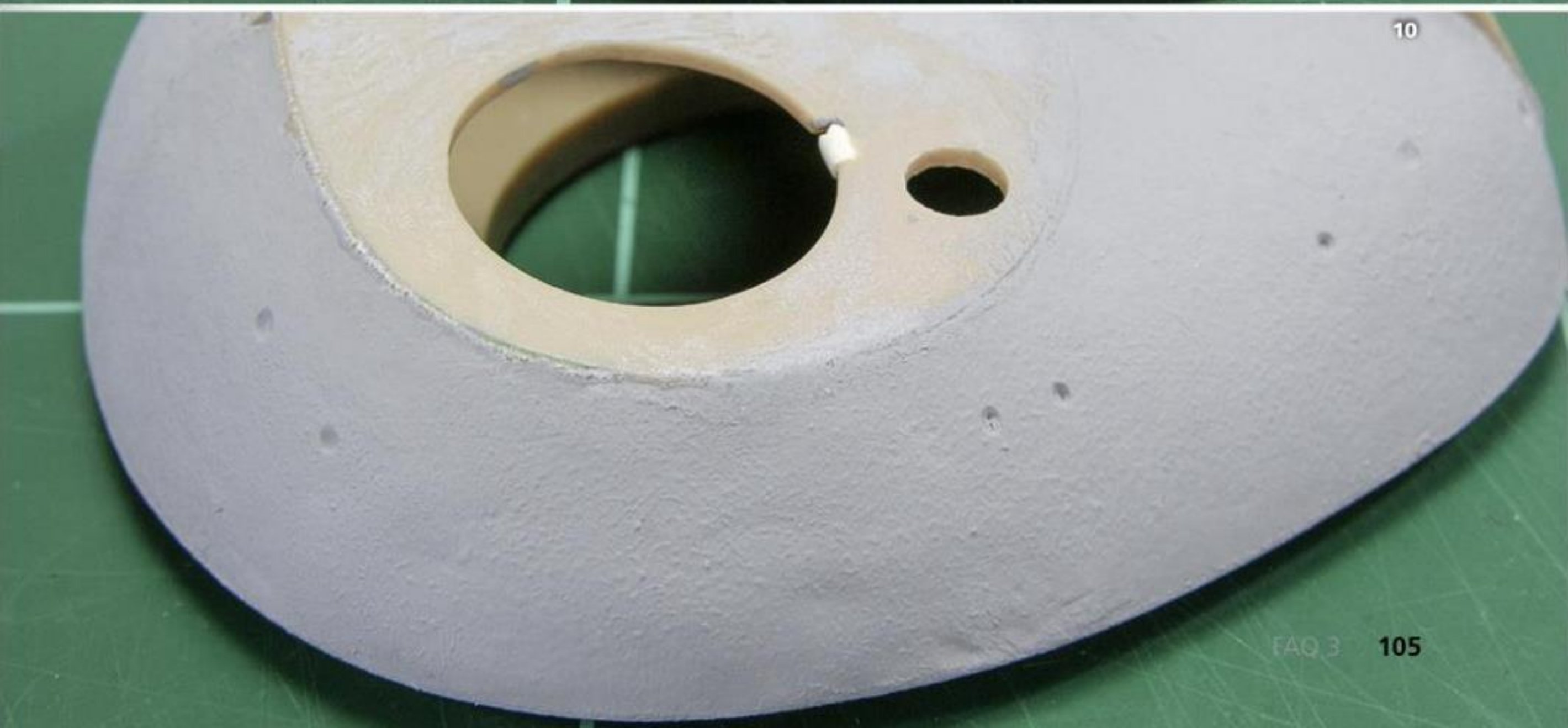
8

(8). After having used the sponge, we leave everything to dry.

(9,10). Once dry, the putty is completely matte and it offers an ideal working surface.



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Easy Cast Texture Medium

(1) Another new product on the market is AK Interactive's AK897. This paste is perfect for creating rough textures, different than the ones we have previously covered.

(2) When opening the package we discover a soft paste. However it has enough density, which is useful for adding volume and texture, depending on the way you use it. This product has multiple applications in different scenarios.

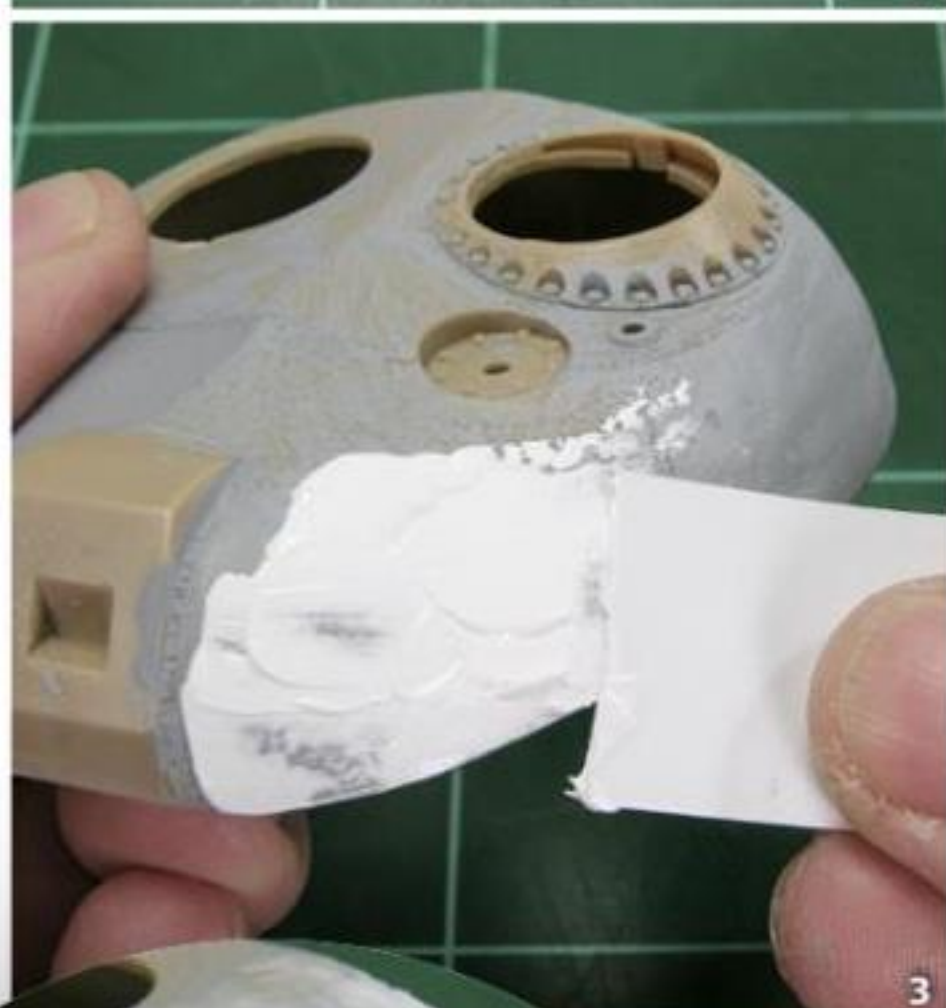
(3) The best way to apply it to curved shapes is to use a piece of cardboard, or something similar, like a business card.

(4) The paste is acrylic-based. This means we can touch it up or eliminate the excess paste with a brush moistened with water.

(5,6) We can create extra texture with a scourer.

(7) We touch up with a new piece of cardboard moistened with water, to eliminate part of the roughness.

(8) As a final step we sand the surface to our liking.





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TEXTURE WITH PUTTY



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TEXTURE WITH PASTE



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ZONE WHERE THE TEXTURE CHANGES

(9,10). The finish and thickness varies depending on the application.

(11). Observe the difference between the surface treated with the paste and the one treated with the putty.

(12). Let's check the results so far by airbrushing a layer of RC100 Russian Gray Green, with a few drops of satin varnish RC501.

(13,14,15). Now we can really compare the textures obtained with the two previous methods. The paint job brings out the differences really well.

II.2.2. ANTI-SLIP SURFACES

Anti-slip surfaces are typical of modern vehicles. They come in different forms and often have specific patterns.

This peculiar feature is a genuine headache for many modelers. It will also provide some challenges in the painting and weathering phase.

We have to deal with how we are going to reproduce these surfaces, but also with how to paint them. Luckily there are some products on the market that help us depict this type of surface.

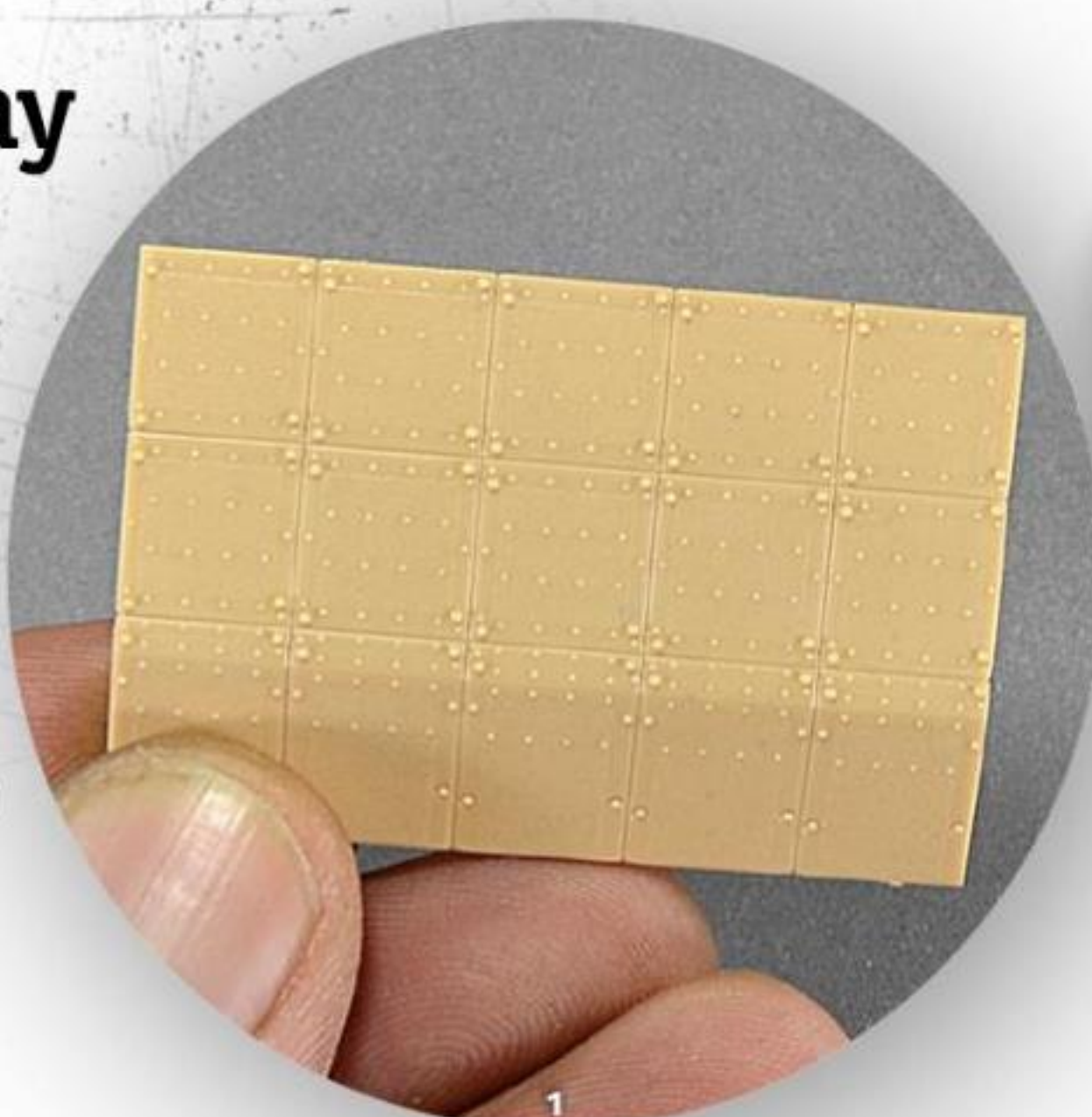
All the added texture and roughness is a headache for weathering, as the pigment tends to accumulate everywhere.

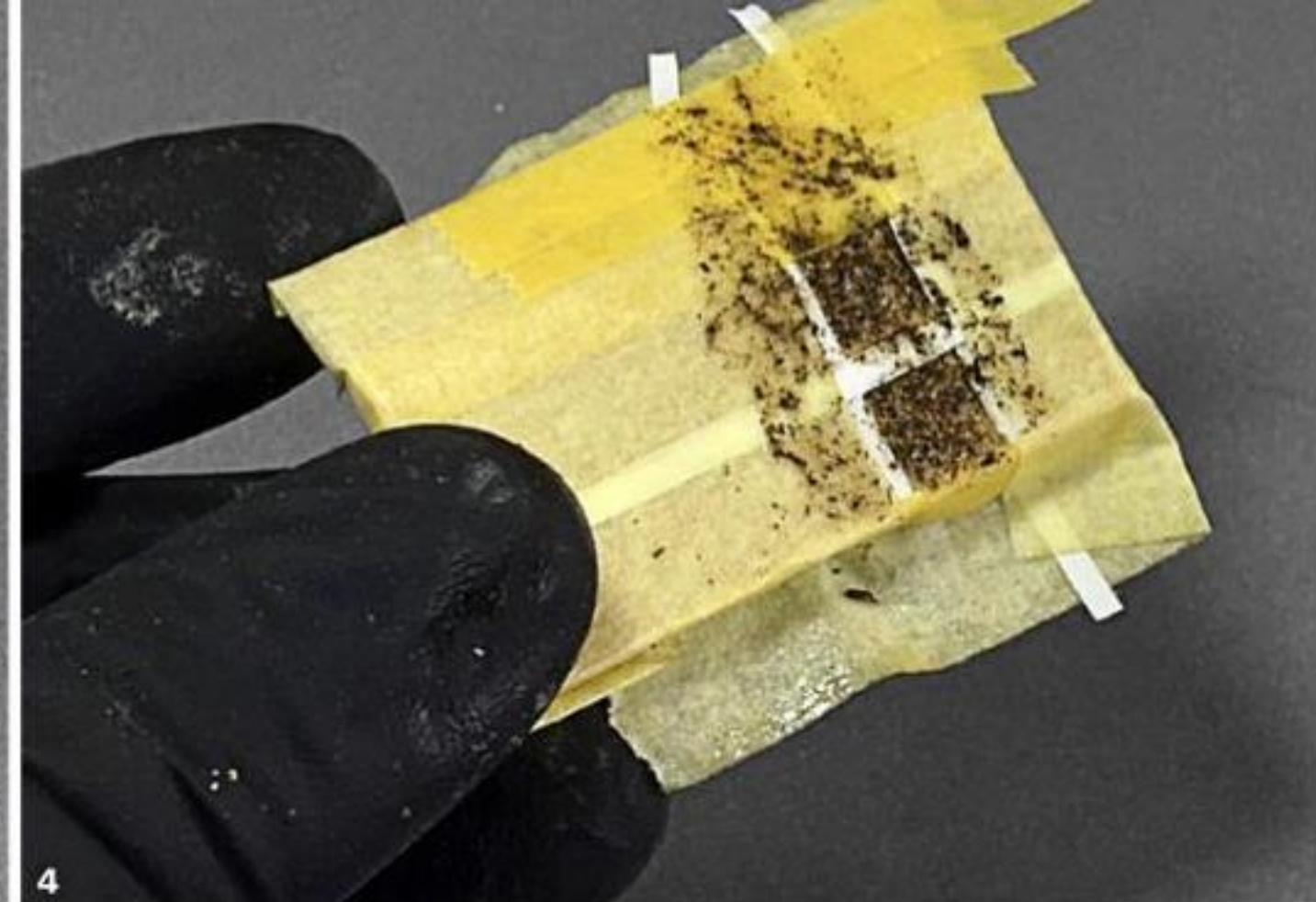
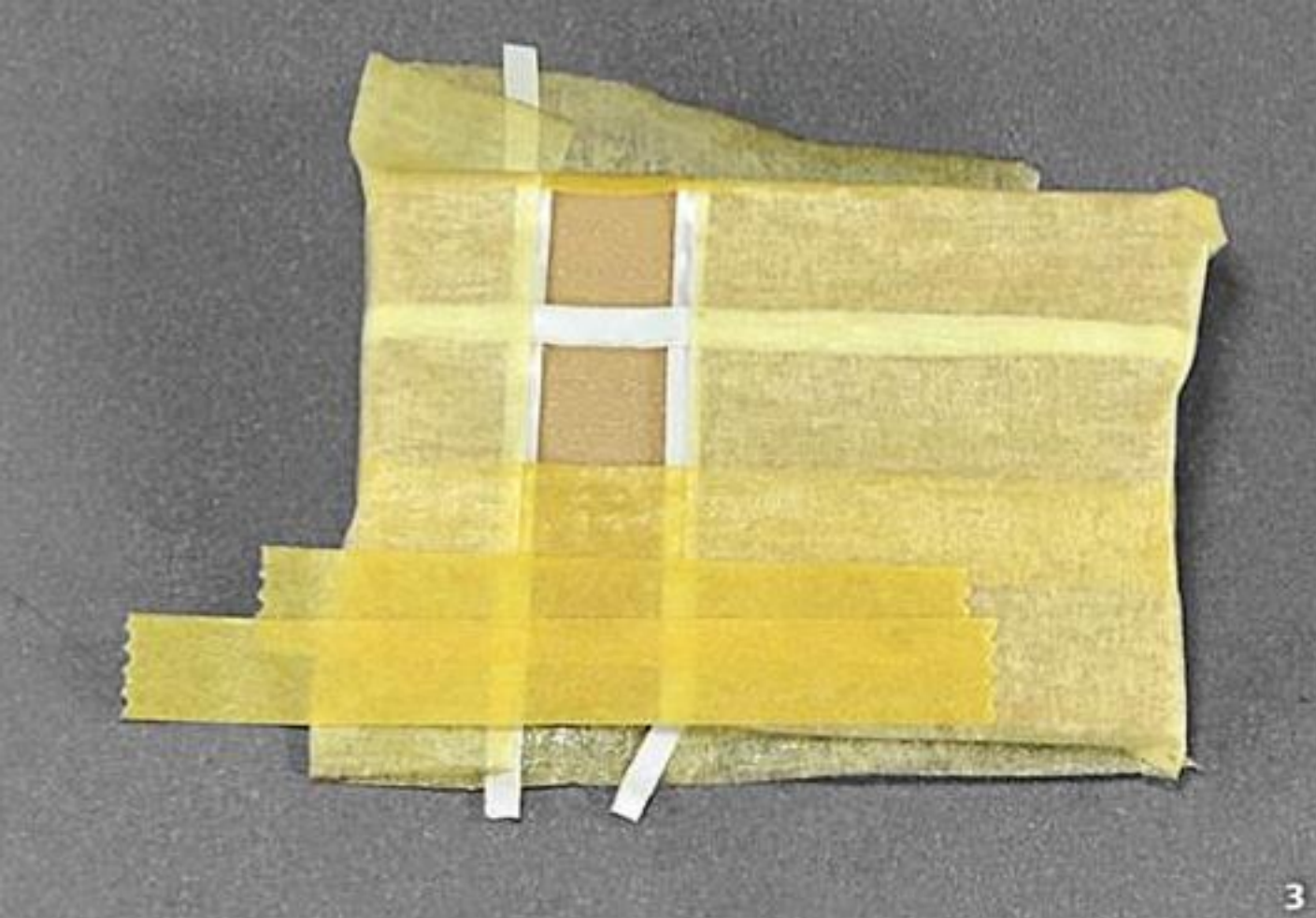


Using a spray

(1). Very often kit manufacturers do not include the anti-slip surfaces or they are represented inaccurately. Here you can see a part belonging to a Bradley. It lacks the anti-slip texture.

(2). There is a solution on the market for some types of anti-slip surfaces, using a spray. This spray adds both texture and colour. This type of paint can be found in the DIY section of some department stores, or even in specialised drugstores.





(3). The main challenge with this approach is that we must meticulously mask the area to be treated. It is also advisable to thoroughly clean and wash the parts on which we will apply the paint.

(4). We must apply the paint in smooth and thin layers, trying not to accumulate the paint and avoiding to get a layer that is too thick and out of scale.

(5). Once the paint has dried we can remove the tape. In case the paint would have run underneath the tape we can easily remove the imperfections with the help of a blade. Here you can see the original texture and the one obtained with the spray, which is much more accurate.

(6,7). These pictures show the result obtained after applying the texture spray on a Centaur. The results look very realistic.



Specific products

(1). Recently VMS released several products to mimic anti-slip surfaces, with different finishes and application modes. These products are actually a combination of a liquid adhesive with a certain density and a very fine grain. They are packed separately and are very easy to apply.

(2). To reproduce the anti-slip surface of a vehicle we must first mask off the areas where there is no such surface. Think of screws, welds, handles and other similar elements. We suggest to use a liquid mask, easy to apply with a brush.

(3). Once we have masked these areas we should wait a few minutes so they can dry.

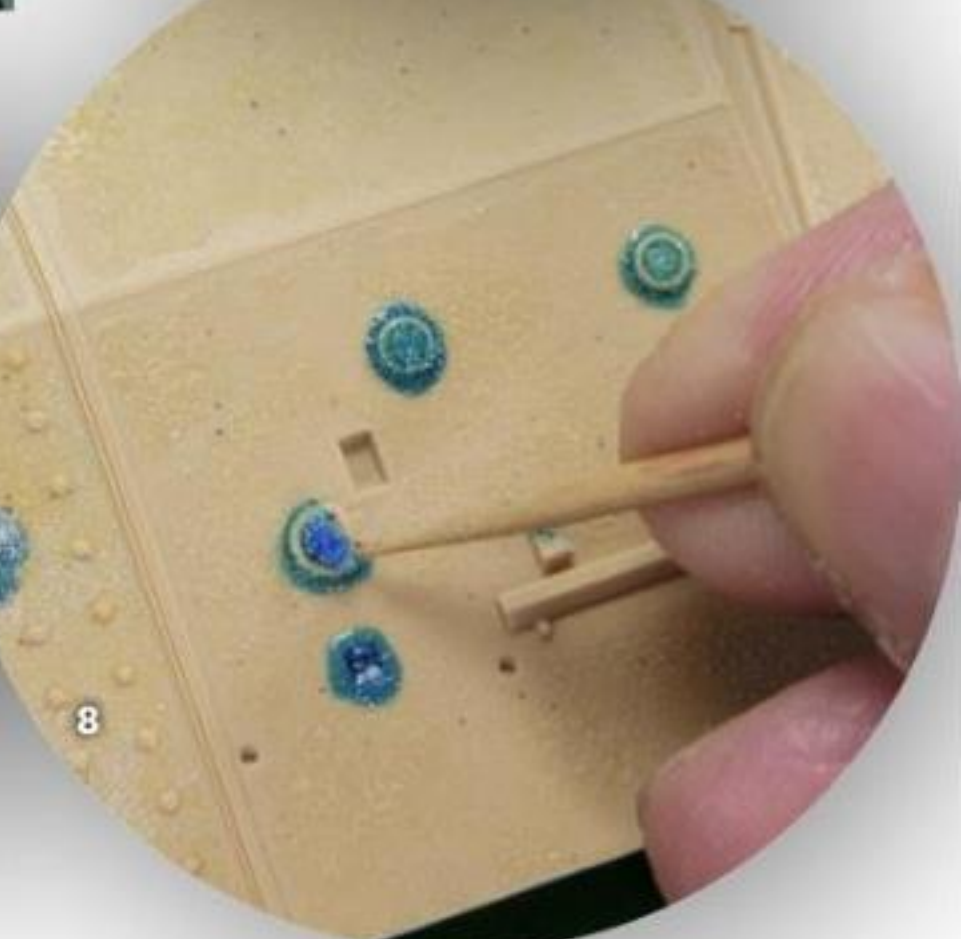
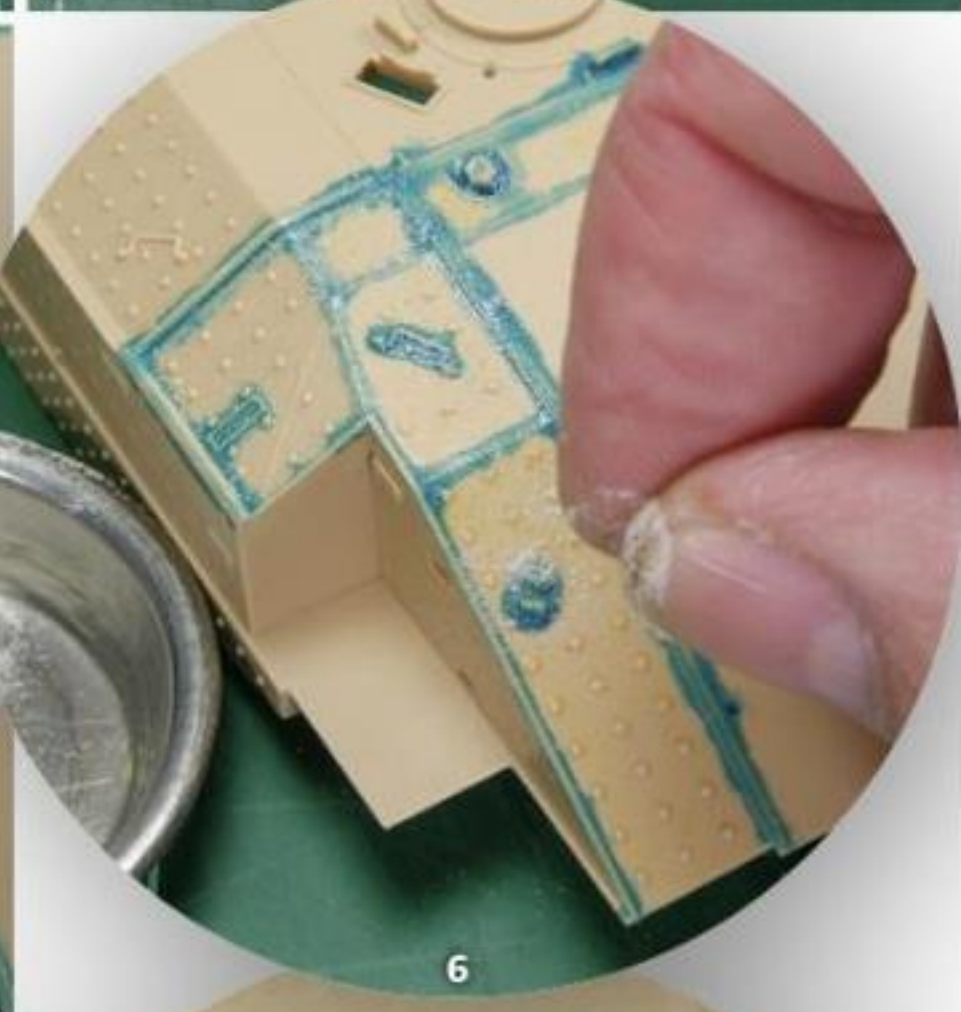
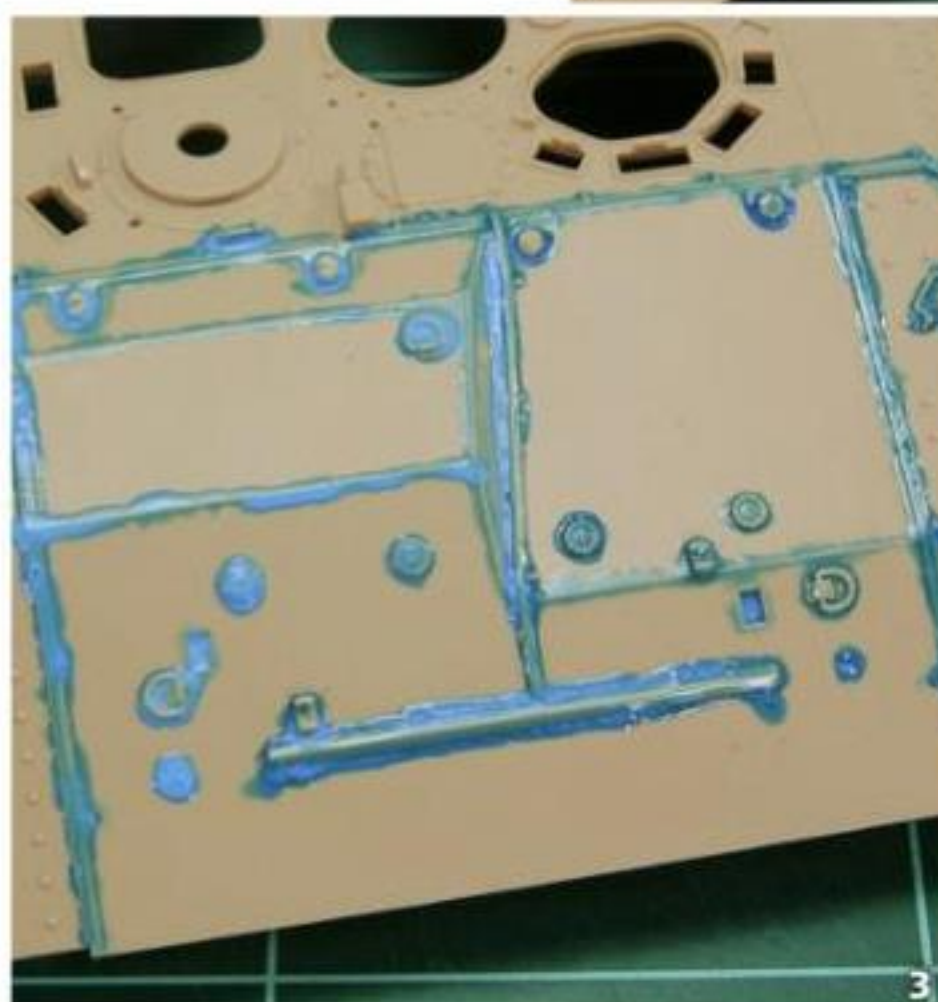
(4). We can apply the two-component texture. Both components have an applicator so we can apply directly from the bottle or we can deposit the glue in a container and apply it with a brush. The sand is applied in the same way, or we sprinkle it on with our fingers.

(5). We chose to dilute the adhesive a little with AK268 Nitro Thinner, to make it more fluid and to brush it on to obtain a satisfactory result.

(6). We also decided to sprinkle on some sand with our fingers. We took a gentle approach and distributed some sand with a couple of light taps of our finger.

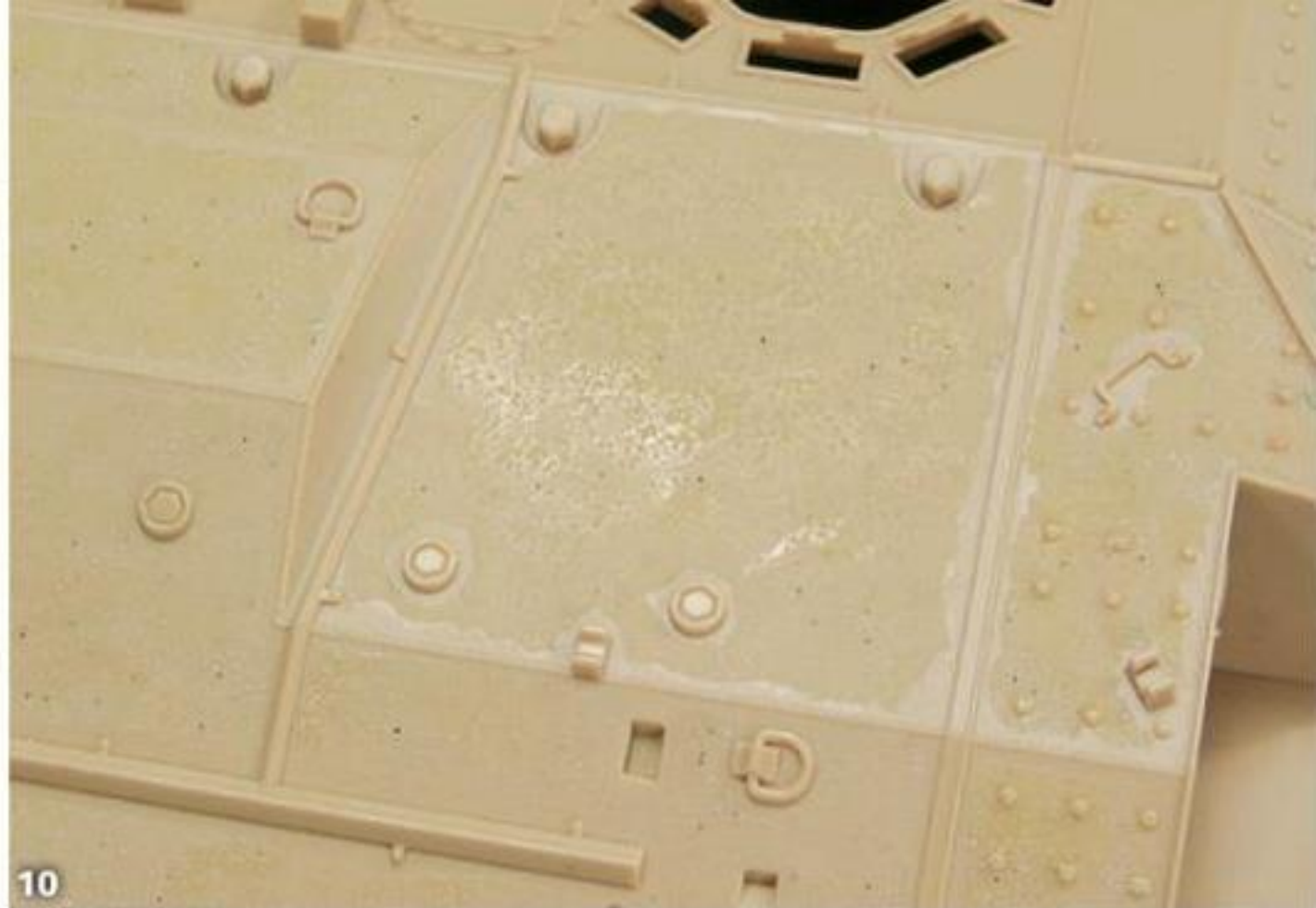
(7). After about 15 minutes we can remove the mask with some tweezers.

(8). A toothpick is an ideal tool for removing the mask in some tricky places.





9



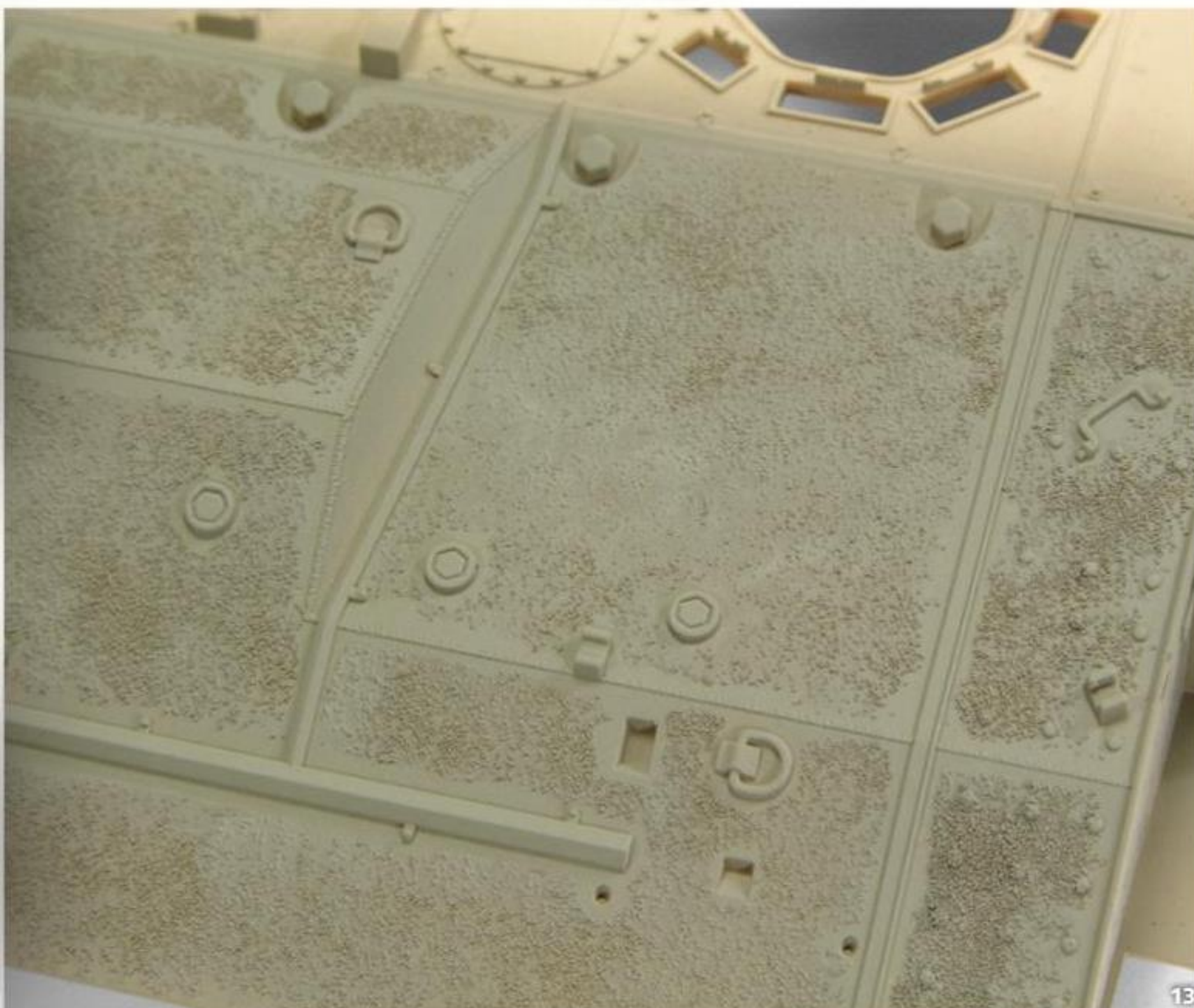
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(9,10). The result is very nice and surprisingly simple to obtain.

(11). To verify the effect we must apply some paint. In this case we have airbrushed RC094 IDF Sinai Gray, perfect for Meng's Achzarit.

(12). Once painted the surface looks very nice with a well-controlled effect. However we must bear in mind that this kind of surface requires a special weathering treatment.

(13). When we compare with a real-life vehicle and we check the thickness and grain dispersion we realise that the result is quite similar and the product offers many possibilities.

With sand and putty

(1). Another way to add texture to certain surfaces of our model is using home-made stuff. There are many ways and a multitude of materials to do the trick. We will show you a couple of very basic methods yielding good results. The first approach, equally effective, is with fine beach sand and putty. We also need masking tape, a brush and a knife.

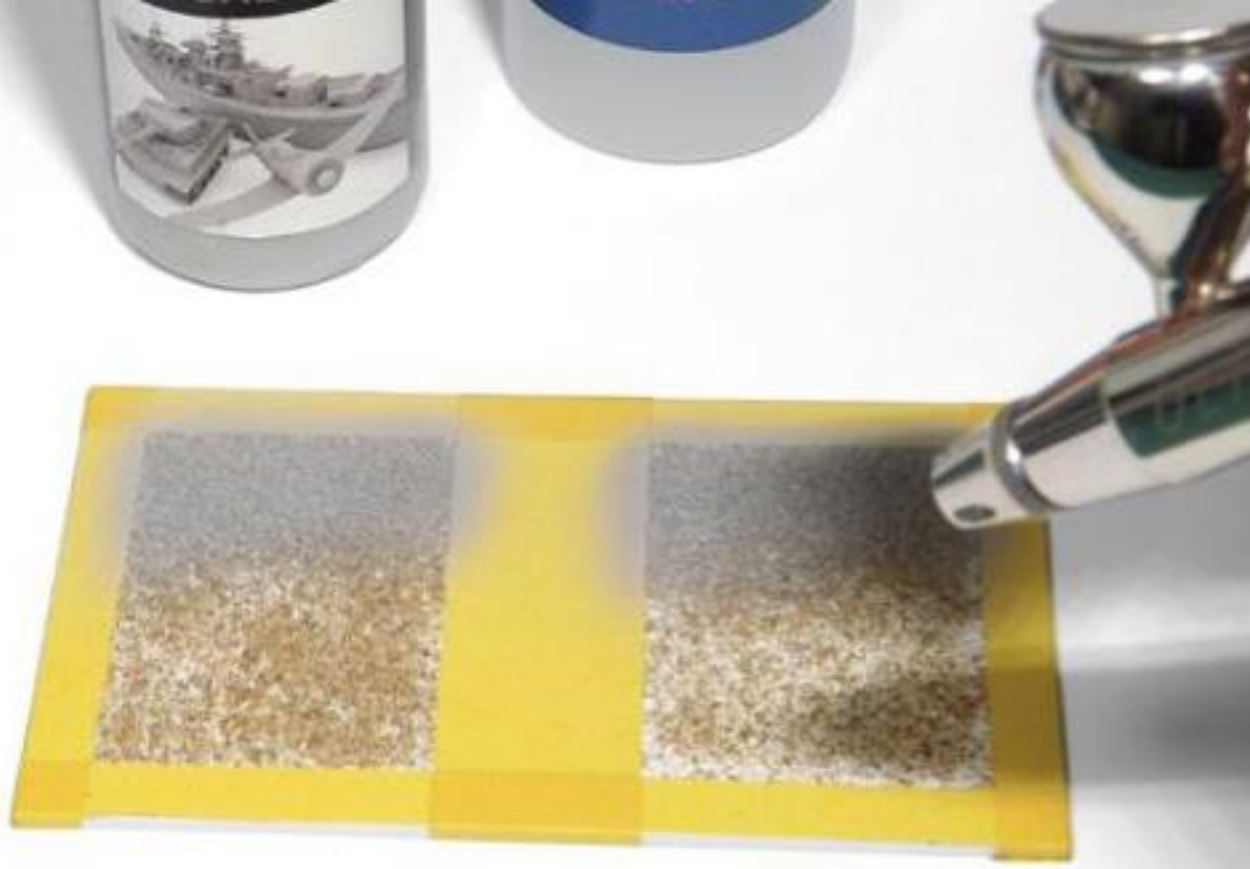
(2). We are going to apply the texture on a plastic strip, so we first have to mask the outer edges to prevent this area from being stained with the mix.

(3). We have delimited two surfaces to apply two slightly different textures.

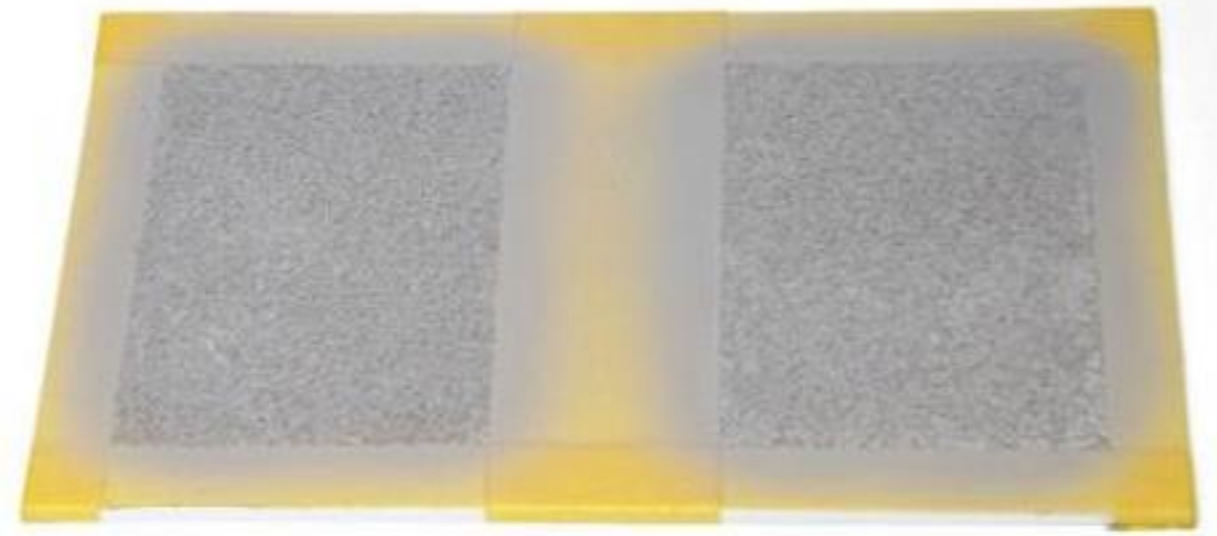
(4). We are using AK103, acrylic white putty, with a very hard finish. After depositing it in a container we dilute it with water and add a small amount of sifted sand.

(5). Once we have applied the same mix on both sides, the left square receives an extra layer of sand sprinkled from above, when the mixture is still wet. The result is two different finishes.

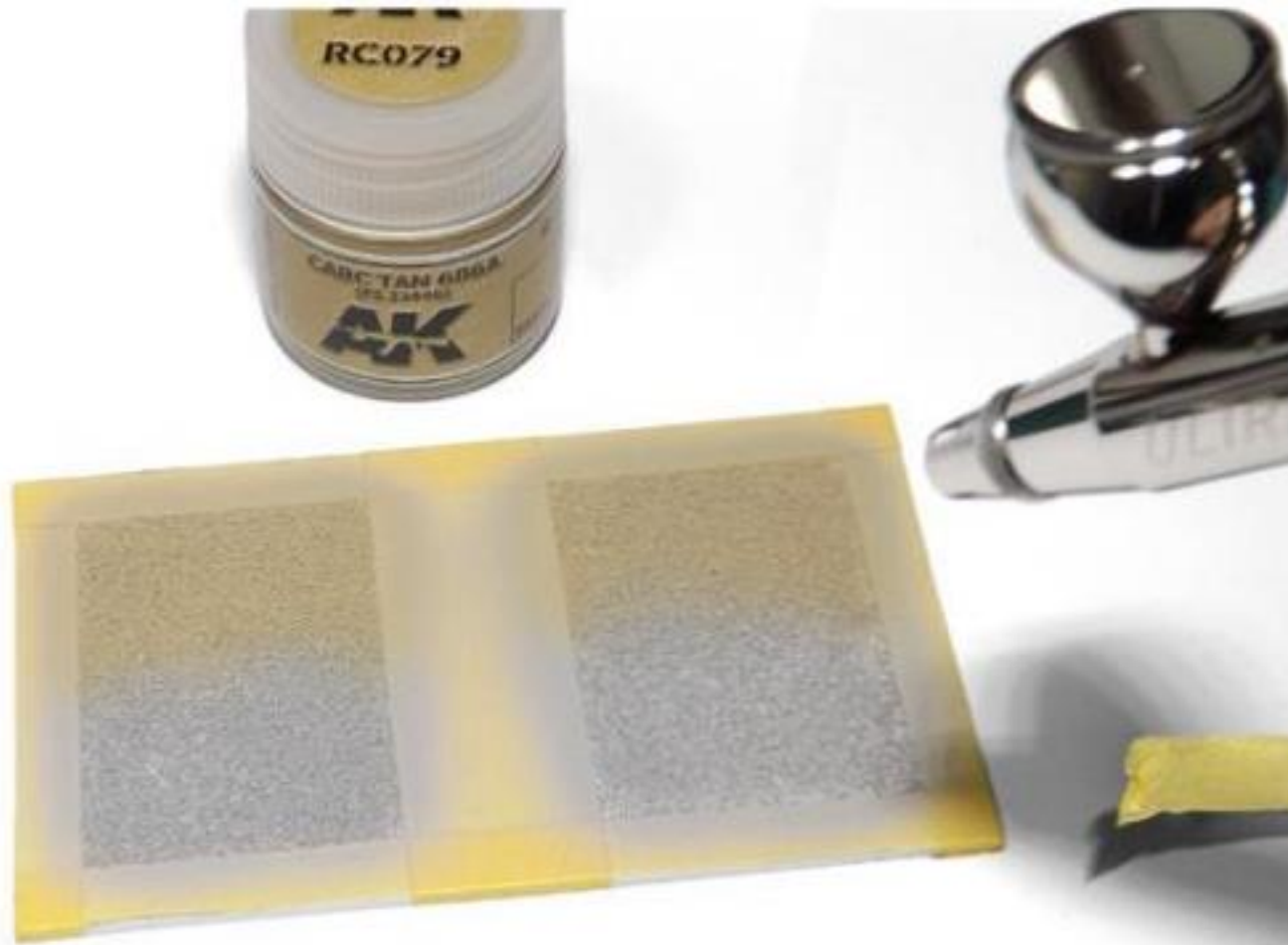




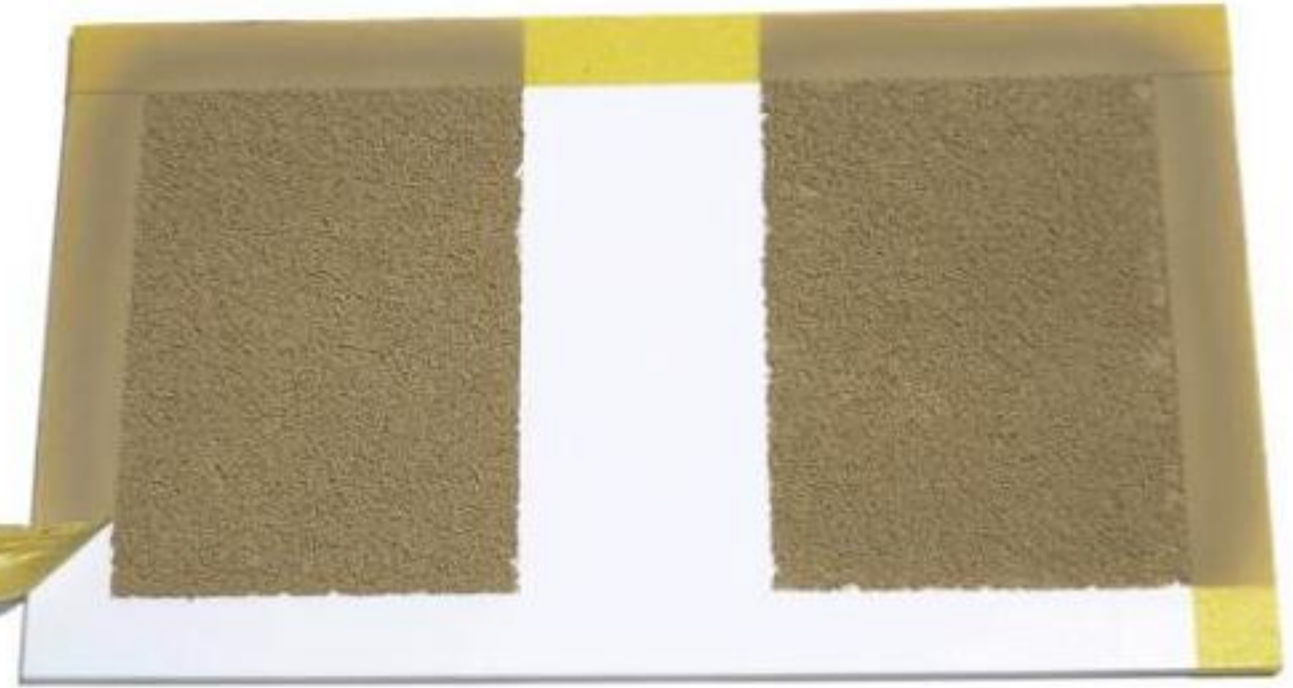
6 7



(6,7). After this has dried for a few minutes, we can clearly see the difference between both sides. Next we airbrush a layer of gray primer to seal the job.



8 9



Once the primer is applied, we continue by airbrushing a layer of RC079 Carc Tan diluted with its specific diluent RC702.

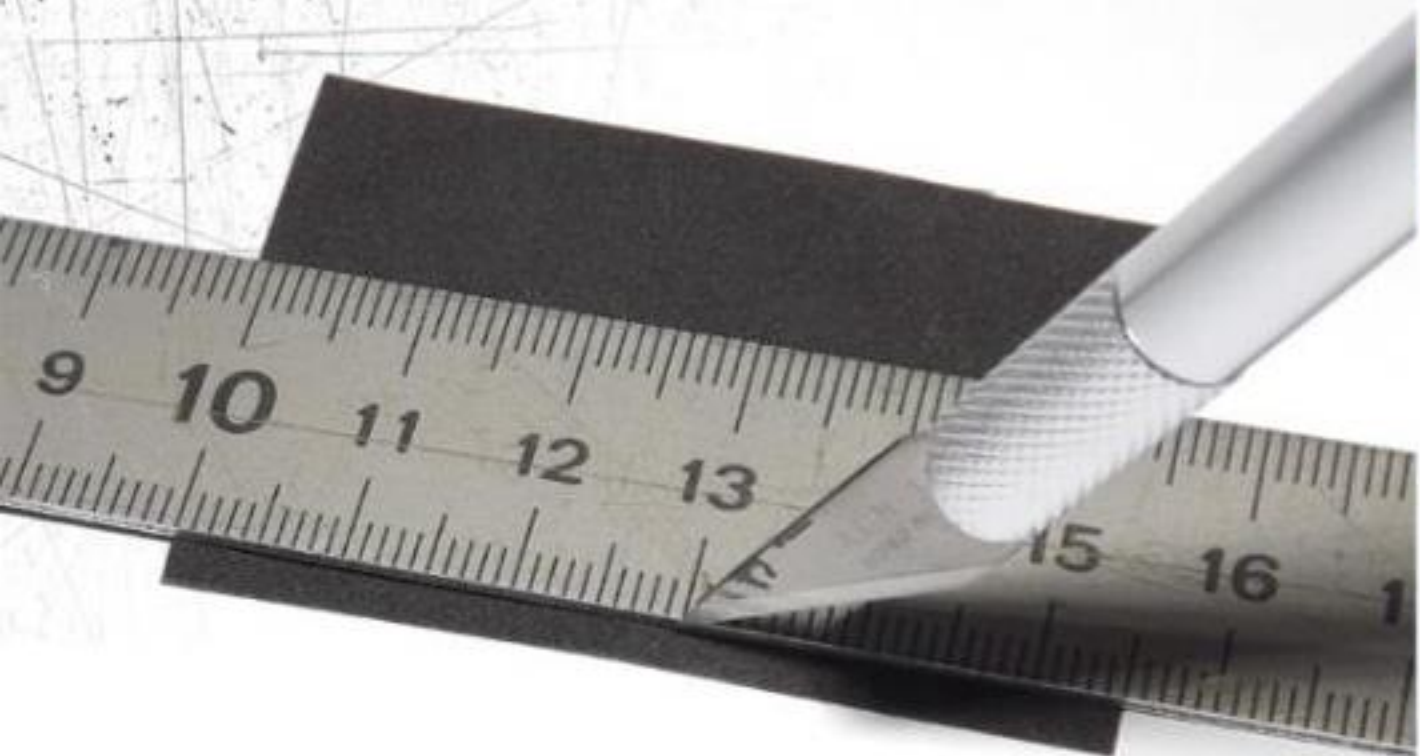
Again, after leaving everything to dry for a couple of minutes, we remove the tape to check and compare the result.



This clearly shows we can get different textures by varying the quantity and grain of the sand we use. In both cases the texture is very convincing and similar to the one applied on many current-day vehicles.



With sandpaper sheet

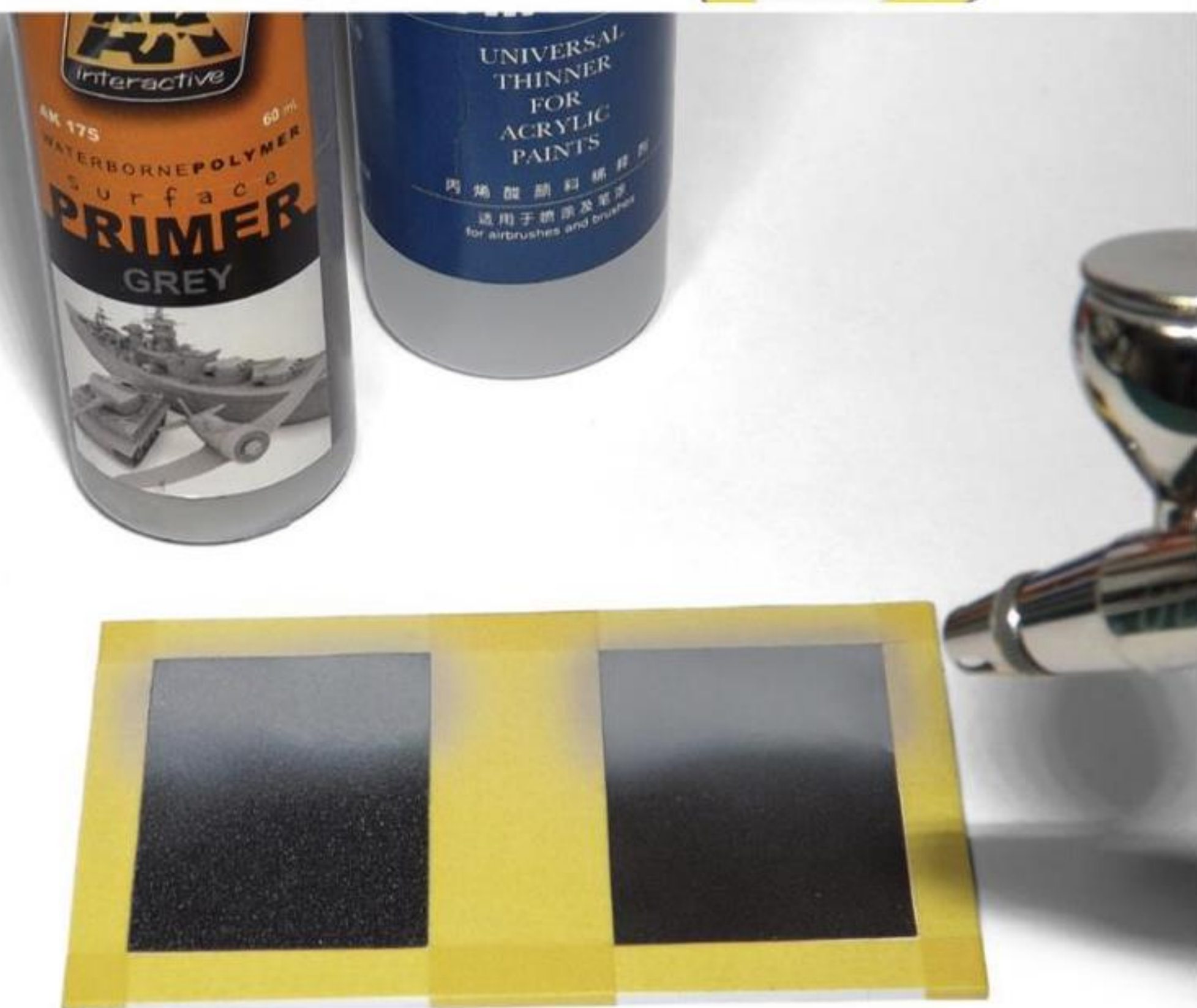


(1). To close this chapter let's see how we can add this type of surface in a faster and more comfortable way. We only need different-grain sandpaper.

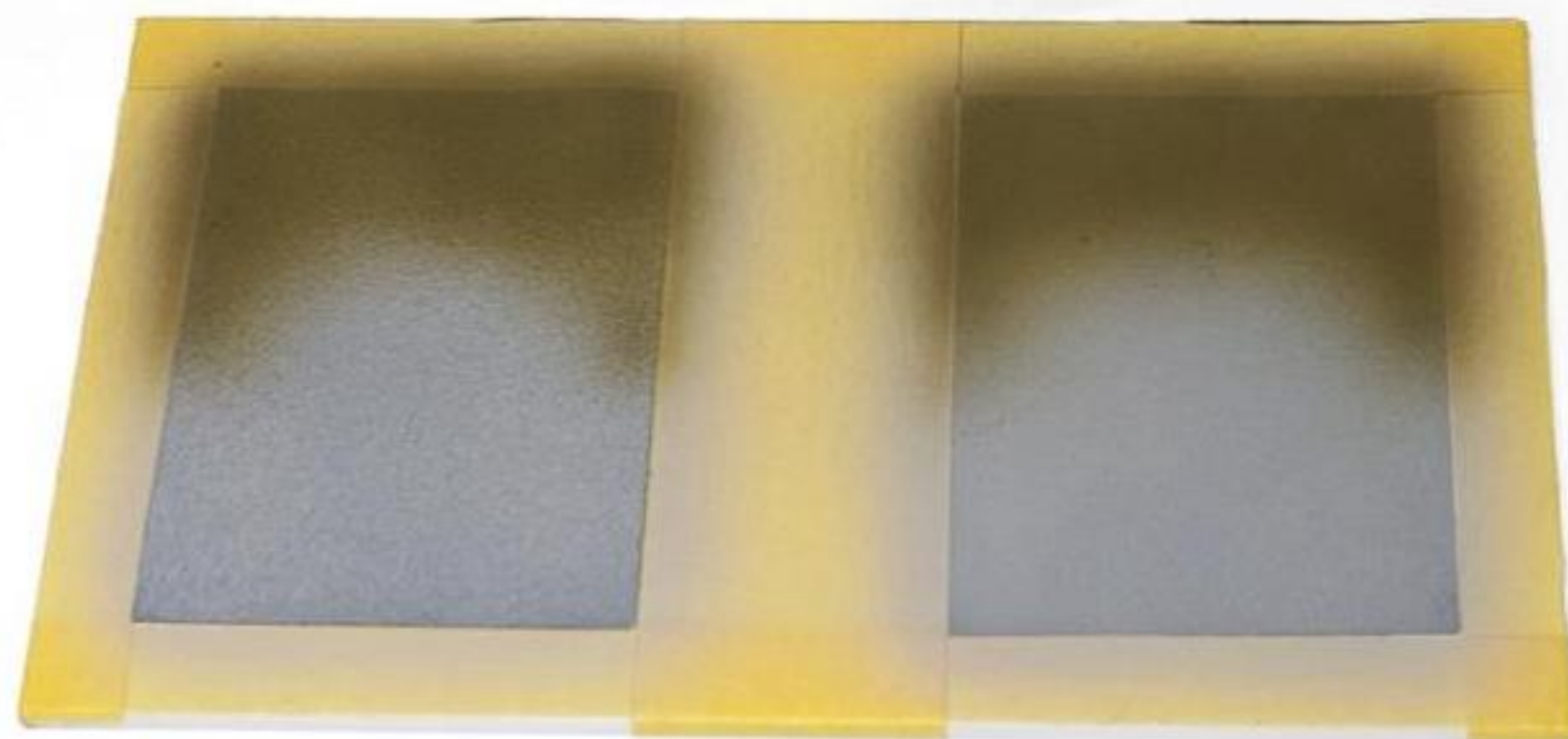
(2). The advantage of this method is that you speed up the process and it is easy to apply. You only need to cut the pieces to shape and use them to cover the areas of the vehicle that have this kind of surface.

(3). After we have cut the sandpaper and delimited the work surface with masking tape, we use white glue to fix the sandpaper. We use two different grains to compare the results.

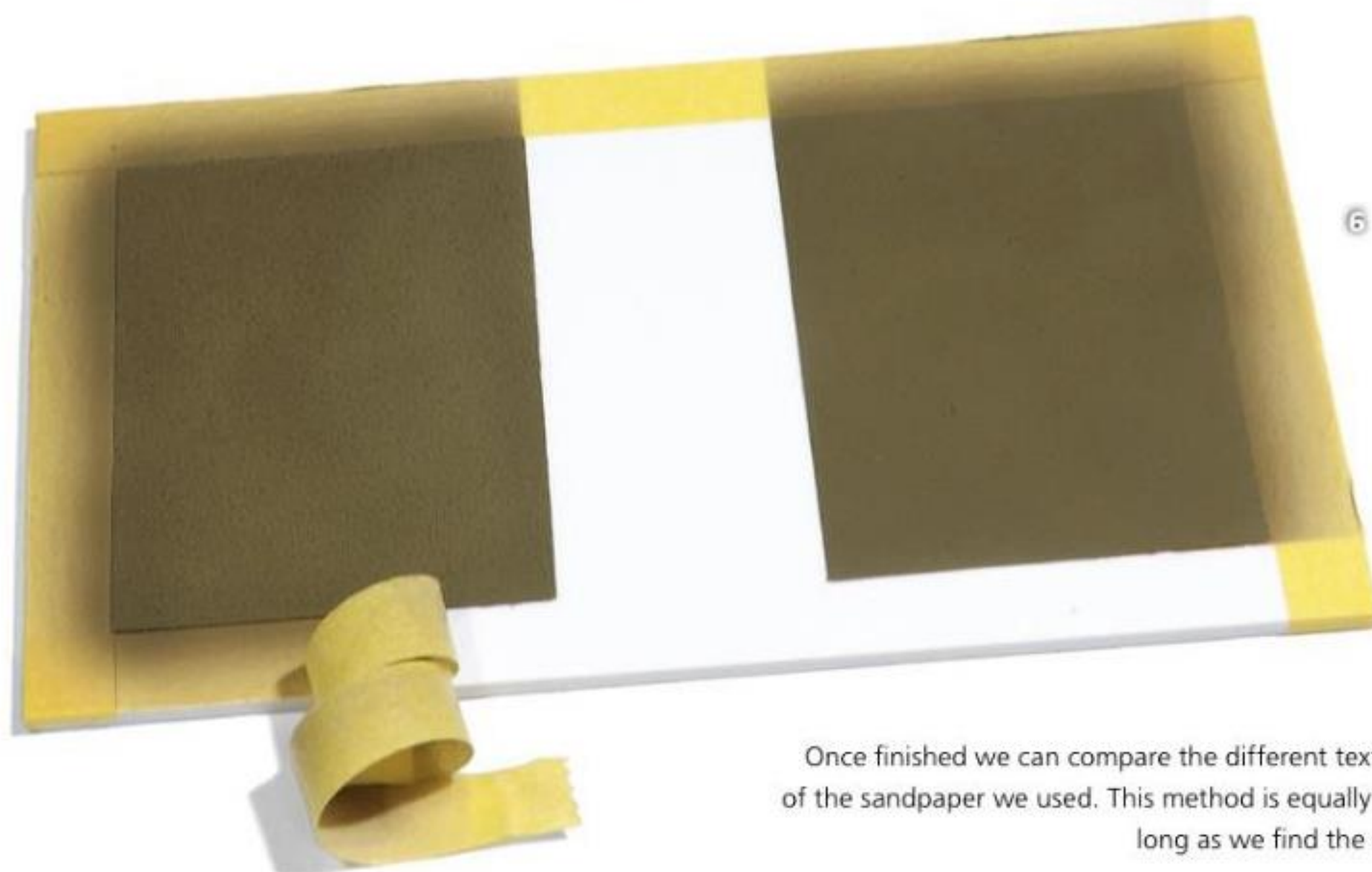
(4). Then we airbrush a layer of gray primer that acts as a basecoat and prepares the surface for the further paint job.



4



- 5 Next we airbrush the paint layer. Here we sprayed RC105 Spanish Green, diluted with its specific diluent.



- 6 Once it is touch-dry we carefully remove the masking tape.

Once finished we can compare the different textures, obtained by the grain of the sandpaper we used. This method is equally valid for different scales, as long as we find the right grain for each surface.



II. TECHNIQUES



CHAP.: 3

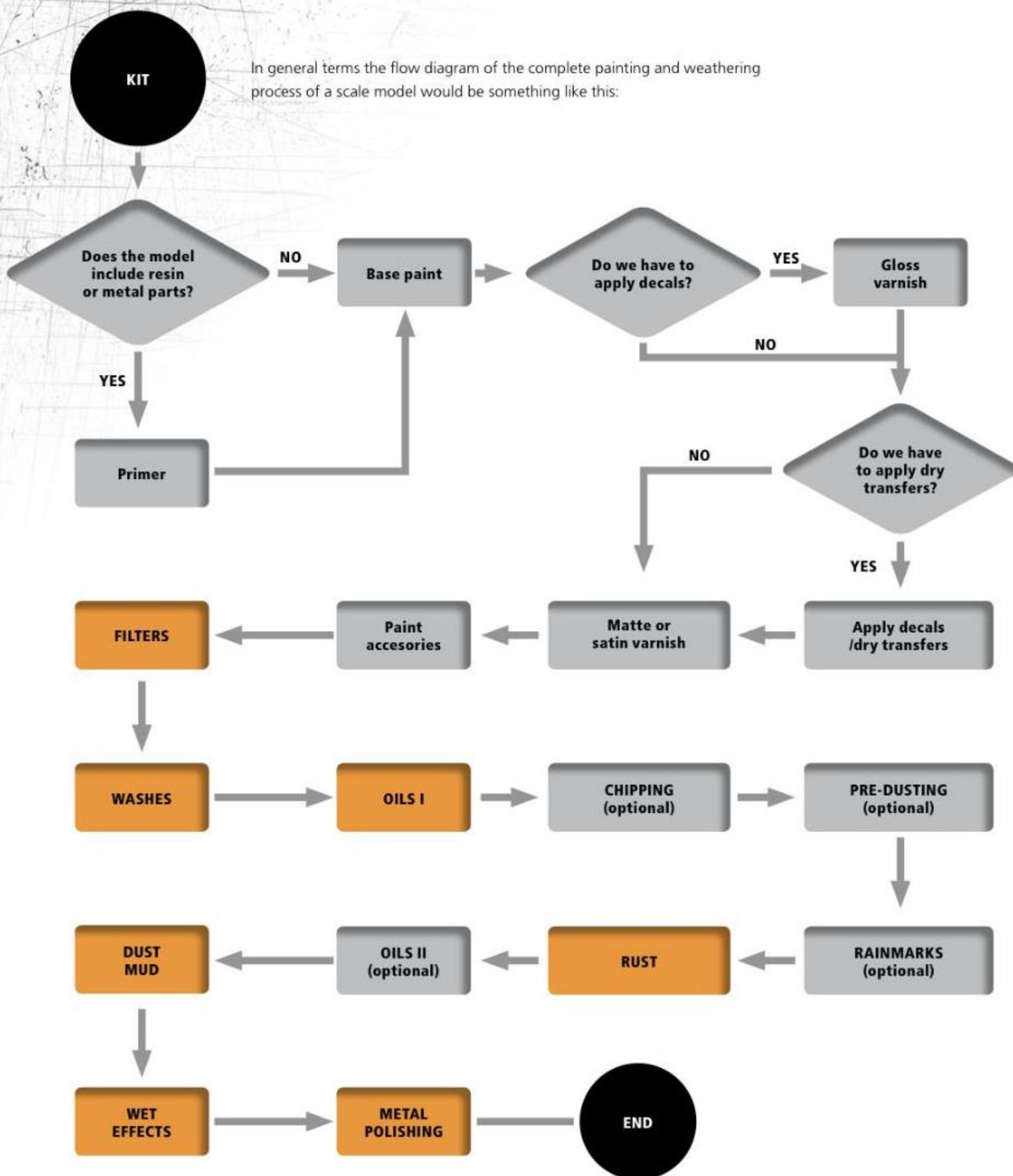
The weathering process

In this chapter we will try to put some order into what is the weathering process.

First, we must clarify that there are many ways to address the weathering process, as with all processes, this was not going to make it less, just more structured. It consists of different phases, of which you do not necessarily have to apply all, but it's good to have a deeper working knowledge.

Despite this, there is a more or less generalized method to approach this process and its phases, or rather its order within the process, it is more or less standard and is shared by many modellers.

Although, once learned, it is the experience and skill of each modeller that dictate the rules and decides when and how to apply each phase. Equally it is sometimes the model in front of us or between our hands that dictates the application or not of certain techniques and therefore decides which phases should be addressed and which ones should be omitted.



All the phases most commonly performed during this process have been represented on this diagram. Although in some of them the term "optional" has been included since it is a dispensable phase and whose realization is not always necessary, in fact none are.

This does not mean that all of them can be ignored, but for example, filters or chipping are not always necessary or the rust. However, if we do not apply washes, we will have to apply oils in the same way to achieve a certain depth.

With all this, next we will try to see what the objective of each phase is and why we apply it in certain circumstances.

Primer

After assembly and before applying the base coat of paint, it is the ideal time to apply a layer of primer. Although this phase has always been optional, right now we would say that it has become mandatory.

A few years ago kits generally only included plastic parts. Once assembled this could be painted without any risk for the final finish of the model.

Now most of the kits include parts in different materials, plastic, resin, metal, ... and the paint is not fixed in the same way to all these materials, so the application of primers becomes more and more necessary.

With the primer we get two things. First, it unifies the whole ensemble and prepares the surface to receive the base paint, will now be more uniform. Secondly it will allow us to check possible assembly faults, remnants of glue, fingerprints or sanding and thus be able to correct them if necessary.



Basecoat

The task and purpose of this phase is more than obvious, but taking note that we are talking about scale model painting it is important to keep in mind a fundamental factor before addressing this phase.

This factor is light and how it affects our model. Given its small dimensions it is necessary to consider what is called the scale reduction factor and how that affects the selected colors when applying the base coat or paint.

Whether it's a uniform or camouflaged base, we'll have to consider highlighting the colors to be used, whilst the same color is not shown the same on the real vehicle as it is on the scale model, often appearing darker, the smaller the size, on the scale model.

Also relating to light, we should consider in this phase how to illuminate our model, but this part it is clearly optional. Despite this, it doesn't imply any artistic license but offers good results. We can opt for overhead lighting or for color modulation. While the first is used to highlight the color as you ascend in height along the model, producing a general highlighting effect, in the second technique the lighting is applied to all the planes and sections of the model giving, as a result, a more contrasted look.





Identification markings, decals and dry transfers

This phase of the diagram is preempted by two questions and so it can be completely optional depending on the answers.

Depending on whether or not our model wears markings, or any type of identification marks dictates when and if we apply varnishes.

If we are going to use conventional or wet decals we may first have to gloss varnish either only the area where these decals are going to be placed or the complete model. The reason is simple. Doing so will prevent the film from being noticed around the decal and we will improve the adherence to the surface.

However, to ensure its fixation we must use special fluids to apply decals that in addition to improving its placement, will also soften it so that it conforms more easily to the surface.

In the case where we use dry transfers, or we paint identification marks with the brush or with the airbrush using masks, we only have to apply a satin varnish to seal the work. This subsequent varnishing will also be applied if we have used wet decals.

The reason is that doing so provides a completely uniform surface and protects the identification marks from the subsequent weathering treatments.



Painting the accessories

This phase is very simple, Its only aim is to help us during the weathering of accessories and tools placed on our model to integrate them with the rest of the vehicle.

There are a whole series of components, mostly tools, located on the external surface of the model that should be painted before being glued in place, this is due to their shape or reduced size making it difficult to apply the weathering separately.

We must also address the possibility that they are not well integrated before being placed in their corresponding location.

The best way to proceed with them is to paint them separately, They are usually small pieces so it is best to use a brush, and, once we have them ready, glue them in place and then apply the weathering to integrate them.



Filters

Although it does not appear as such in the diagram, this phase is completely optional. Once the base paint has been applied, in a completely uniform color or any of the options seen, in essence what we have is a flat and even painted surface.

Although the light will produce contrasts in the painting, with the filters we can modify some of the properties of the color such as its saturation and luminosity.

Basically with its application we will be able to differentiate colors with the same tone by adding filters such as green, yellowish, grayish or bluish, as an example.

We can apply the filters in a general way, changing the appearance of a color uniformly or selectively applied, changing only part of the model because we are interested in highlighting the appearance of a zone, piece or specific panel.



The final objective, therefore, will be to provide chromatic richness and nuances to the surface of the model. Obviously its application becomes more necessary in models painted in a single color as opposed to camouflaged ones in which the contrast is provided by the camouflage itself.



Washes

This is one of the more important phases and is usually applied by most modelers. It does not matter if we are facing a uniform or camouflaged base, light or dark, or of any other type because in any of these situations, the washes will work and achieve their objectives.

The application is intended to outline all the engraved details, nooks and crannies to make them stand out. The ideal is to apply them on a more or less satin surface, or even gloss, which makes the wash flow and spread much better.

The main objectives are to add more depth to the model and to highlight all the details on, for instance, the panel lines and bulkheads, such as any small rivet or screw no matter how small.



In general we must choose a color slightly darker than the color chosen for the base or the darkest one applied in a camouflage. In a dark camouflage or with black areas it can be more effective to use a medium or light gray.





Usually a palette of 3 or 4 colors it will be enough to fade our model. Therefore, the colour choice will depend largely on the environmental conditions and the area on which we will hypothetically place the model. The base color must also influence this choice and should be taken into account.

Oils I

In this phase we will begin to apply the oil paints for several different reasons. It is quite important and is also considered by the great majority of modellers as mandatory.

The oils are a very versatile medium with huge potential, easy to apply and recoverable if applied over a satin or gloss surface.

Commonly called oil fading, using oils we will try to reproduce the general worn and faded look of the paint on a model, hence its name. Perhaps the key, and therefore the difficulty for many beginners, is the correct choice of colors to use.

They are usually applied in dots over the surface and then, using a brush, blended. We must be careful with this way of application since, depending on how the oils are blended, the surface could look as though we just applied a single oil mix of the complete palette over all of the surface.

We should also consider the possibility of applying the dots taking into account the color modulation or even the panel lightning, placing the lightest tones in the upper area and the darkest ones in the lower areas, thus maintaining the effect achieved in the previous painting steps.

In any case, there are many ways to apply them and they are all valid, hence its potential. If we move forward in the flow chart we will see that there is another phase in which oils are used with a different application technique.

Chipping



The chipping phase could be considered optional, as its application depends on multiple factors related to use, location, mobility, ... that mark both their presence and quantity. In any case we can choose. They are usually applied in two stages, thus achieving a three-dimensional and depth effect.

In a first stage they are usually applied in a slightly lighter color than the base color. to imitate scratches and bumps. In the second stage we will cover the internal area with a dark brown or orange color, trying to imitate the deepest wear and rust.

The distribution and size are the most important characteristics. They must be placed in a logical and reasonable manner, always in the more exposed areas. Regarding size, the golden rule must be applied, "Less is more", always works.

There are several methods to create both stages with acrylic paint, applied with a Marta Kolinsky fine brush or using chipping fluids. Both equally valid and complementary. This application adds a degree of complexity and realism to the weathering process.



Pre-dust effect

This is clearly an optional phase although its application facilitates the subsequent dust effects.

It consists of airbrushing a soft and quite diluted layer of very matt paint onto certain areas of our model which will help as a base for the further treatments and weathering. The chosen colour palette will always include earth appearance colours, either light or dark.

Obviously the surfaces that accumulate most of the dust and soil are the closest to the ground, zones on the model with more wear&tear, around the turret on some armored vehicles, and in horizontal surfaces and around all kinds of nooks where a greater amount of dirt tends to accumulate.



Rainmarks

As with the previous one, this is optional and it can be performed in combination with the previous pre-dusting phase.

As its own name indicates, its application it is intended to represent the characteristic marks left by the rain on vertical surfaces, cleaning them where accumulated dirt and dust have been removed.

To represent these clean vertical strokes the ideal technique is to airbrush enamel or clear lacquer, subsequently sweeping the surface with a fine brush moistened with thinner, thereby removing part of the airbrushed paint.

You can also achieve good results by using acrylics. It is an attractive effect and it requires practice of its application.





Rust

The representation of all types of rust can also be considered an optional phase although its inclusion contributes to the addition of depth and tonal variation. Although it is an eye-catching effect, it can be considered more as artistic license than a representation of reality.

Due to humidity and atmospheric conditions, rust usually appears in areas with chipping or scratches showing the characteristic streaking rust. If not overdone, it is attractive and brings some degree of realism, but we must take care in the number, shape and size, especially in operational models.

To represent them you can use a combination of enamel and oil. Today there are many specific colors for it. We can use a fine brush to paint them, and same one can then be moistened with thinner to blend and create different types of streaks and rust effects.

Oils II

This phase will be completely optional as long as we have applied the oils in the previous phase of the weathering process.

In the previous phase they were applied in dots, but in this phase we will see another way to apply them in a more localized effect.

We will start with a palette composed of 3 or 4 colours, as in the previous phase, and always dependent on the results or look we want to achieve. It is advisable to always have a light color, one medium and one dark. With this we can guarantee a correct contrast in our model.

If we have painted chips and rust, oils should be applied over these as they will be partially covered and their effect will be reduced resulting in a more realistic appearance in both cases.

We will apply the oils in a very selective way, acting only on specific areas as we try to enhance a given effect, it can be the light or dark dust effect, the orange appearance of iron, the blackened area of the engine cover, ... and in general, any other detail whilst always applying the specific color straight from the palette and blending it later.



Dust/ mud effects

We could say that in this phase the model will acquire, more or less, the operational effect we have been looking for.

When a vehicle is deployed to any area, due the weather conditions, it soon begins to be covered by dust and mud adding interesting effects.

In this phase we will use enamels, pigments, plaster of Paris , gravel, sand and static grass to depict all kinds of dust and mud accumulations. These can be fixed with White Spirit, pigment fixer, varnish or gravel and sand fixer.

All these product will be mixed all together to obtain interesting textures. They will be applied in different ways, washes, streaks, deposits or splashes over the surface. We can use brushes with soft or hard bristles and auxiliary tools such as cocktail sticks or even the airbrush.

We can obtain variations from a light dust effect up to thick accumulations of mud that will help us to set up our model in a specific scene, display base, vignette or diorama. In this case is advisable to use the same effects both on the vehicle and the ground.





Wet effects

It would be weird to see a vehicle without a single stain of either oil, grease, fuel or any other fluid that has been employed by the crew or maintenance personnel over any area of the surface.

For this reason, this phase is important and practically mandatory as we will try to represent, in greater or lesser degrees, wet effects of all kinds, unequivocal signs of activity on the vehicle.

All this range of well executed effects will bring great tonal richness and will end up becoming the center of attention.

We can use the ubiquitous oils for bitumen or grease, glossy or satin varnishes or new specific glazes to perfectly mimic spills of fuel or oil, or even a combination of all of them, that is in the end what offers the best results providing variability with a multitude of possible brightness and finishes.

All these wet effects and stains in general are susceptible to being overdone on the entire surface of the model but we must be careful, not when placing the brush, but of where we represent a fuel, oil or grease stain and how to do it in the most credible and realistic way.

Together with these effects, we must not forget the effect caused by water on the model, a wet surface under the rain or by having driven on wet ground. These effects differ only by the means used to facilitate them.



Metal polishing and scratches

Constant rubbing and handling cause certain areas to be more exposed to this phase, they are edges, corners or specific areas with a lot of use. To represent bare or polished metal in these areas we can use normal softcore pencils, a graphite bar or even metallic pigments.

To apply the pencil or the graphite bar we will do it directly by scratching the surface. To apply the pigments we can use our own fingertip, carefully, as this tends to stain, or alternatively use a pencil diffuser. In all cases we will polish the area where the metal has been applied to obtain the characteristic brightness. This is a final phase.

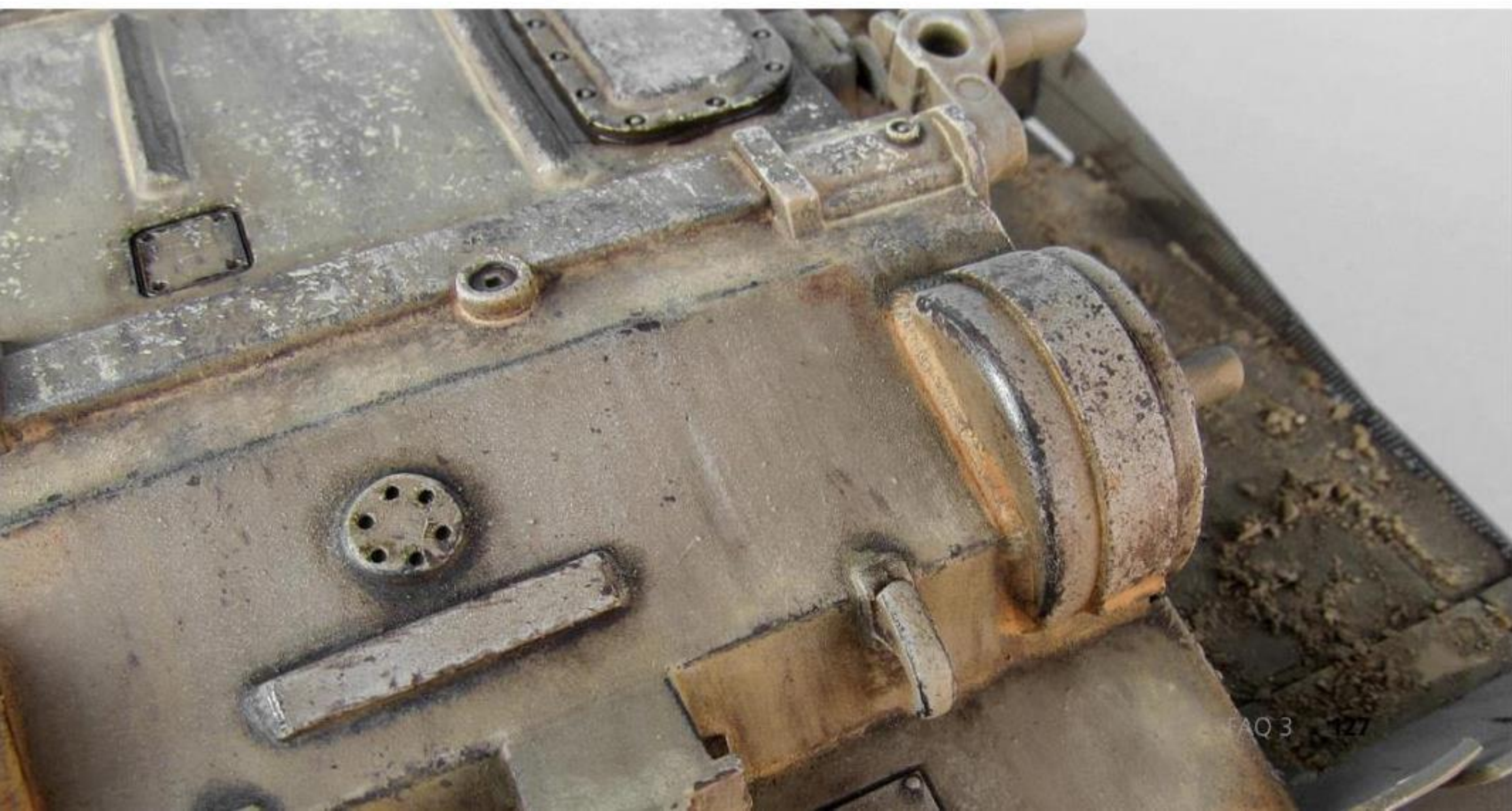
After concluding the weathering process and going through the phases previously covered, we have in front of us the finished model with a series of effects applied to achieve a specific look.

The objective should be fixed and be clear from the beginning. If we do so and our skills are adequate, we should be satisfied with the result obtained.

We must be able then to differentiate the obtained effects, techniques and means used for them. In the end it is the sum of all these which makes the result a whole, compact, in which nothing remains strange or out of place.

If we spoil something or we are not completely satisfied, stay calm, because we have more models and more time, and also, and this is the most important thing, we have more experience.

It's all about practicing, making mistakes and always learning.



II. TECHNIQUES



CHAP.: 4

Bases, camouflage and markings

Once we have finished the assembly phase and detailed our model we begin the painting adventure. This task is not easy because of the multitude of possibilities offered by both the manufacturers and the thousands of references at our disposal. We only have to visit a couple of pages on the internet to find a ton of inspiration.

The first important decision therefore will be to choose between a base with a single colour or a camouflaged one. In any case we have to consider a multitude of factors that can influence the finish of our model and its final appearance. It is important to be clear about what you want to achieve and make the right choice when selecting the colours.

Throughout this chapter we will see how to paint with one or several colours, and in the latter case, how to mask to get the best results. On top of that we will treat colours from the point of view of light, to highlight certain shapes and sizes, using the scale reduction factor.

We will also cover how to apply decals, markings and other numerals to distinguish our model from the rest. Finally we will work on a monocolour base to create extreme rust effects by using chipping fluids.



II.4.1.

PLAIN COLOR SURFACES

Regardless of the colours that we are going to use on our model, we must be clear about the main tool we are going to use for this task.

In the old days not all modelers had airbrush equipment and most of the models were painted by brush. However, over time, the airbrush and its dance partner, the compressor, were introduced in a massive way in the market, at an affordable cost.

We must be aware that in order to obtain the best results, we must use the right tools. In this case the use of the airbrush and the compressor are essential since many effects and finishes related to the base paint and its lighting, are difficult to obtain with a brush.

There is a wide range of airbrushes, as well as compressors. We must realise that the better these tools are, the better the results we'll get with them. Although these tools seem expensive, this is not the case since priming and applying base coats on our models takes up so much of our time and attention.



Next we will see how to apply plain colour bases and how to lighten them conveniently. Both processes are basic, but they will affect the final look of our model.

Zenithal lightning

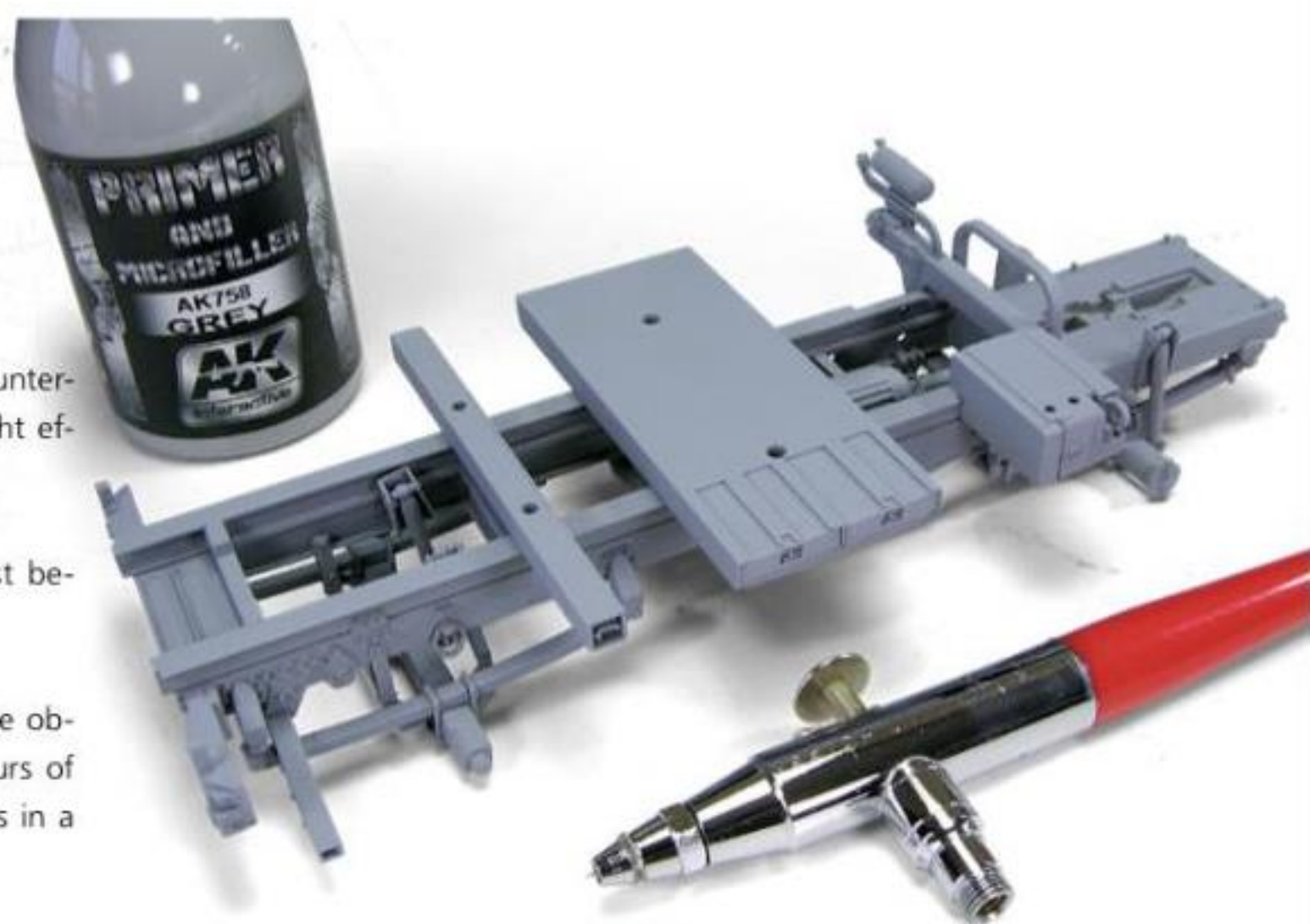
Painting models is not the same as painting their life-size counterparts. The reduction of size and surfaces causes different light effects and reflections and therefore requires special attention.

It's advisable to accentuate the light, increasing the contrast between areas, also accentuating the shades.

Overhead light is light projected on the upper surfaces of the objects so, our goal in scale modeling is to highlight the colours of the horizontal areas and the upper parts of the vertical ones in a continuous and progressive way.

(1). To start the paint job we must apply a good primer. We can choose between acrylics, enamel-based paint, or we can just airbrush a layer of a neutral gray colour.

(2). This application also guarantees a good working base and it helps us to integrate the different pieces of various materials and detect possible construction errors.



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5 6



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(3). After choosing the base color, AK796 Nato Green in this case, we airbrush the whole model ensuring that the paint layer is homogeneous. It's advisable to use the appropriate diluents and cover the surface in several thin layers.

(4). Another parameter to take into account when working with models of small size is the scale factor. It is recommended after choosing the right color to highlight it a bit. Due to the minor size the colors appear darker on the scale model. To the previous base color we have added a bit of AK715 Resedagrün.

(5). The first light is applied adding to the base color a little bit of AK2015 Raf Sky. It is advisable to apply thin layers, spraying from above to accumulate the color on the most exposed surfaces.

(6) For the second light we increase the proportion of green insisting with the airbrush from above. The results are easily appreciable.

(7,8). The lighting process must be smooth without too strident effects. A pair of highlights is usually enough to obtain a good result.



9

(9). Once finished we can apply some effects such as accentuating a panel through lighting. Simply masking an area and applying a glaze with the lightest mix we previously used will achieve this effect.

(10,11). Have a look at both pictures and notice how the doors have been differentiated just by playing with the lighting process.

(12). In this other example we purposely used gray as a primer.

(13,14). Next we airbrushed a mix of acrylics, AK791 IDF Sinai Gray 82 and AK792 IDF Sand Gray 73.

(15). In the case of a vehicle the size of this Ford Mutt, and with little horizontal surfaces, the application of lighting can be complicated.

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132

FAO 3



14 15



16 17



18 19



(16). This Merkava has been painted with an acrylic base, using the colour recommended by the kit manufacturer and highlighted with a very light sand tone.

(17). After applying the base, we work on details such as caps, logs, rivets and screws, with various acrylics applied with a brush.

(18). Since we are dealing with a model with a certain size, we do not apply any lighting treatment. However, the colour of many details has been modified by brush, creating a simulated aspect of lighting.

(19). Observe how the various colour changes between parts and panels within the same colour range created a certain aspect of lighting given the size of the model.





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23

(20). In this example, the base or selected areas are pre-shaded with a dark colour.

(21). Then a red primer is applied in thin layers, allowing the colour underneath to show.

(22). Finally, the sand colour is also applied in thin layers to create transparencies. The dark colours previously applied still come through, creating a pattern of light and shadow on the sand tone. The highlighting of the horizontal surfaces and the top of some inclined planes is achieved by adding a very light colour to the sand base tone.

(23). We can also use glazes to lighten up some areas. This T55 Enigma has been airbrushed with XF57 Buff, completely covering the base.

(24). XF2 White has been used and applied following a general lighting pattern. Unlike the zenithal technique, with this pattern, we can light up practically all surfaces.

(25). Finally, a layer of varnish has been applied: X22 Gloss. This seals the work and reduces the contrast between light and shadow spots.



24



25

Colour modulation

Although it would not be correct to speak of 'counterpoint' to define modulation in relation to overhead light, it is another way of diametrical illumination that differs from the previous one.

Perhaps the most interesting part of this way of illuminating a model is the artistic license that allows the creation of more or less arbitrary light and shadow variations.

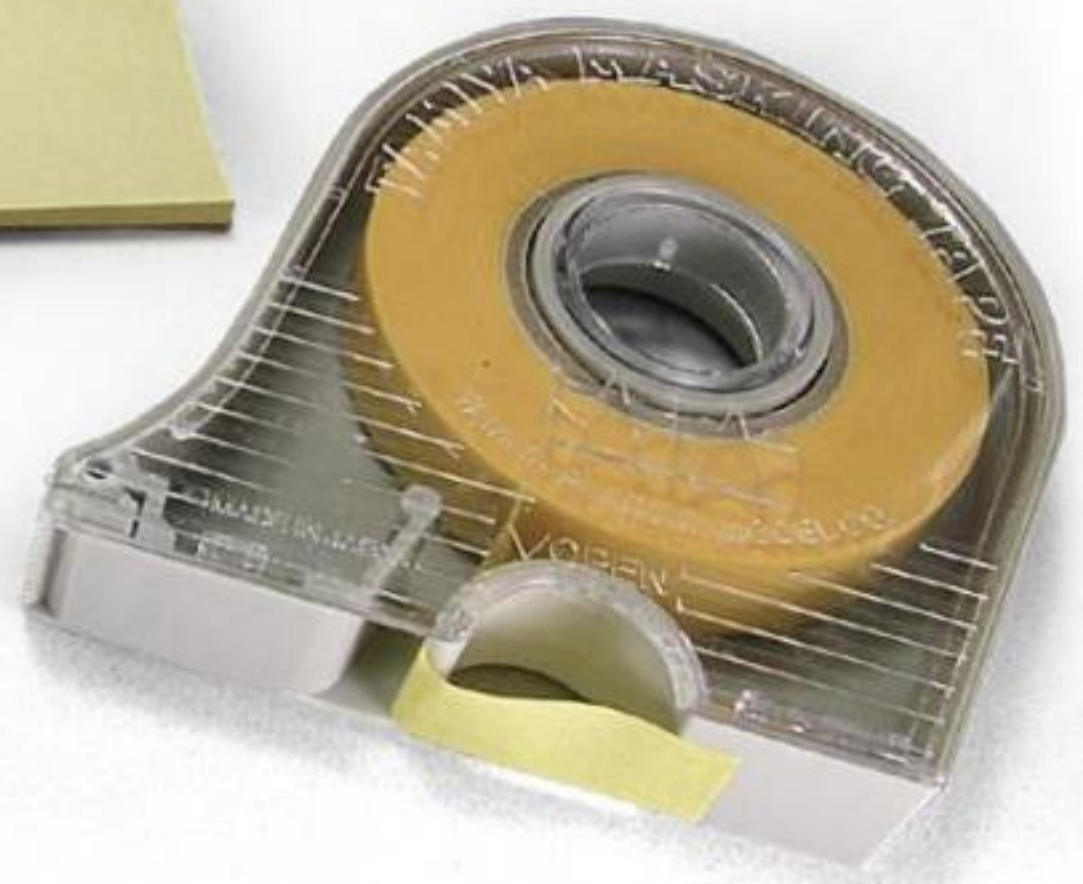
A model under overhead light appears natural and thanks to this new way of lighting, that is, by modulating the light, the look becomes more interesting.

In the end, as with many things, the best results are obtained when we are not able to distinguish modulation or its effects because they are minimized due to the subsequent weathering process. The effect is there, but it's barely noticeable.

(1). We have selected this Challenger from Trumpeter to illustrate the modulating process. Its panels and angles make it a perfect candidate to demonstrate this technique based on the use of various masks.

(2). After thoroughly cleaning the model with alcohol we proceed by airbrushing the base colour. On this occasion we will carry out the whole process with the new lacquers from the Real Colors range. We apply RC093 British Sand Yellow in thin layers to cover the surface.

(3). The basic colours that we need are a base colour, RC093 British Sand Yellow, also RC004 Flat White to highlight, and RC023 Olive Drab to add some shadows, and finally RC001 Flat Black, some sticky notes and masking tape.



(4). Basically the process of modulation is always the same. Let's focus on a single part first. For starters we have to delimit the area on which we will apply the gradient so we mask the panel limit or adjacent area. Next we airbrush the first lighting colour, always from the middle of the panel towards the selected area of maximum light. For this we mix the base colour and the one we selected to illuminate in an approximate proportion of 4:1. We have to apply the paint in very thin layers so it's best to dilute the mixture a lot. The ideal approach is to load the airbrush, test and correct if necessary.

(5). For the second lighting layer we add a pinch of light paint to brighten the colour and we airbrush again, but only affecting the top of the panel.

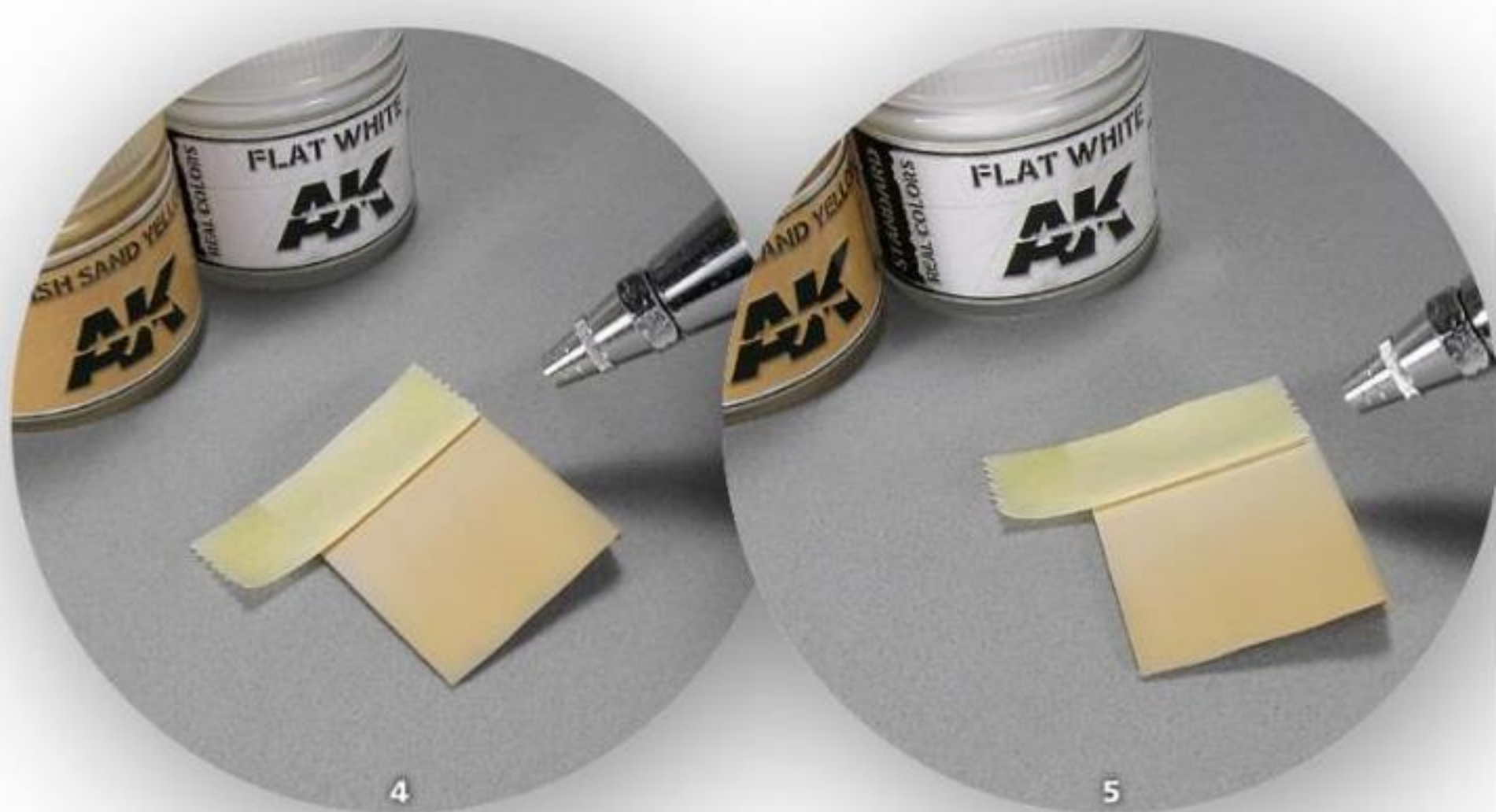
(6). After the lighting process you must create some soft transitions, delimiting the volumes.

(7). For the application of the first shadow we follow the same process as with the lighting. We mix the base with the shade colour in a proportion of 4:1. We airbrush the paint, but in the opposite way of the lighting job, that is, from the middle downwards.

(8). For the second shadow we added a pinch of black to the previous mix and airbrushed only the bottom part of the panel. Doing so allows us to finalise the lighting and shading job.

(9). Here you can see the basic application scheme of lights and shadows and their extent.

(10). This picture allows us to appreciate the contrast between modulated and untreated panels.





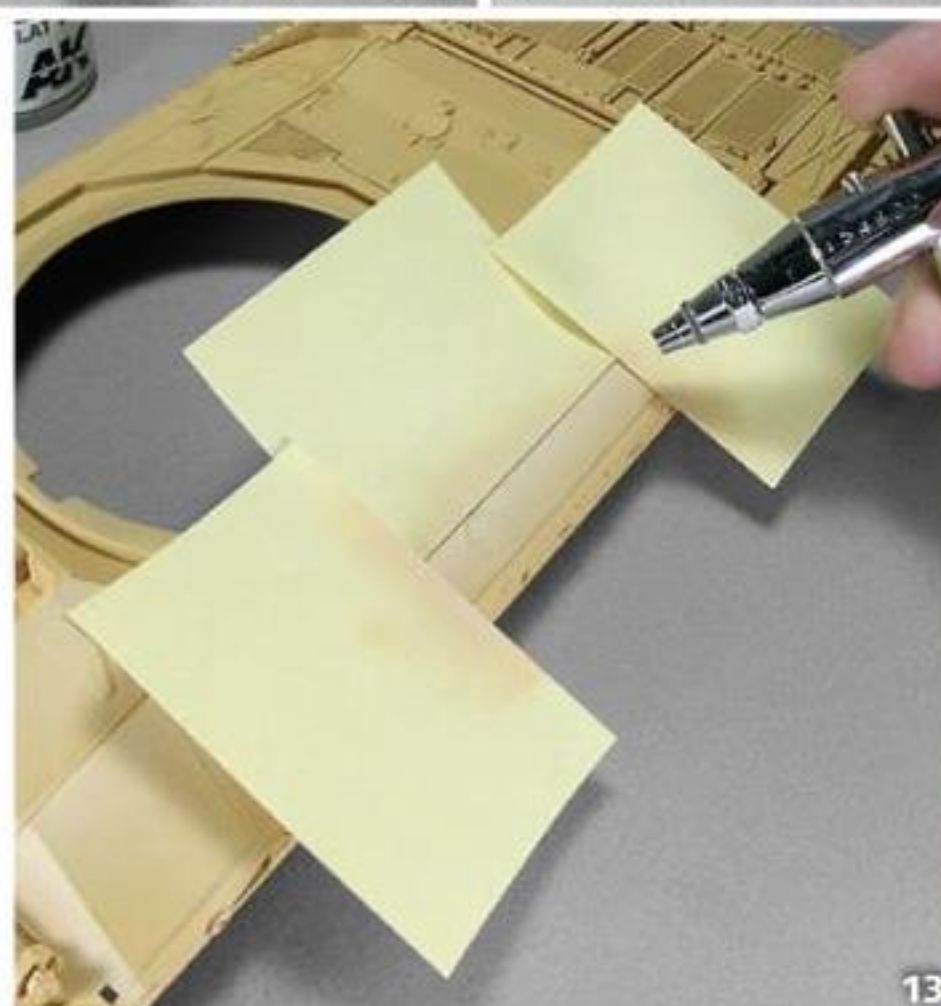
11



12

(11). The use of masks during the modulation process is vital for creating contrasts between the various panels. It is convenient to use the vehicle's own shapes and to let those determine what to modulate. Generally in vertical areas we will apply overhead lighting, while for horizontal parts we will apply direct light, according to a more aesthetic and arbitrary pattern.

(12). Once we remove the masks the difference becomes clear, with a high contrast between the base layer and the lighter surfaces.



13



14

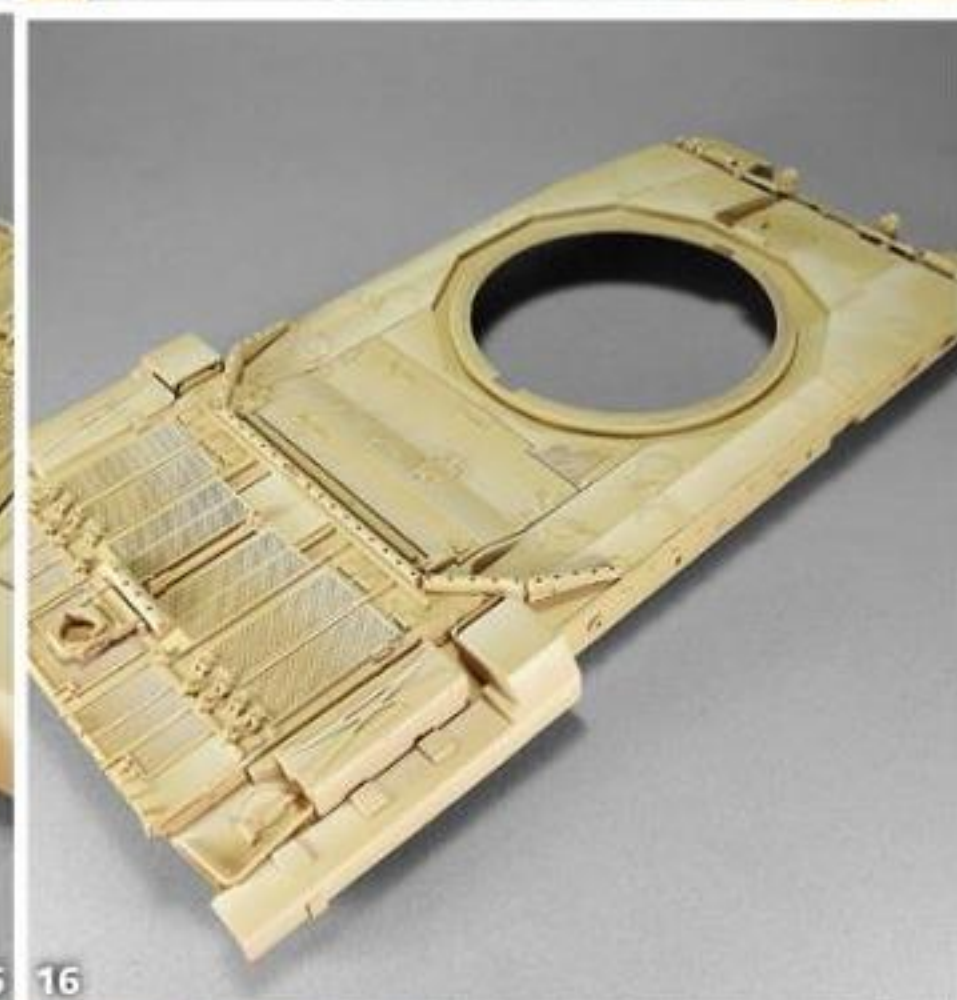
(13). Certain zones allow the use of other types of masks. On these superstructure sections we use sticky notes, which allow a fast and easy handling.

(14). The position of the masks will depend at all times on where we are going to direct the light or the shadow. Although the aesthetic character is important, we should be consistent and fix a central point that directs light or shade throughout the entire superstructure.

(15,16). Observe the contrast that was created by carefully applying the lighting method on the whole superstructure.



15



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(17). On round parts, such as the gun barrel, it is easier to use adhesive tape as a mask, delimiting each section of the tube on which we will work.

(18). Once the tape is removed, we can clearly see the different light effects.



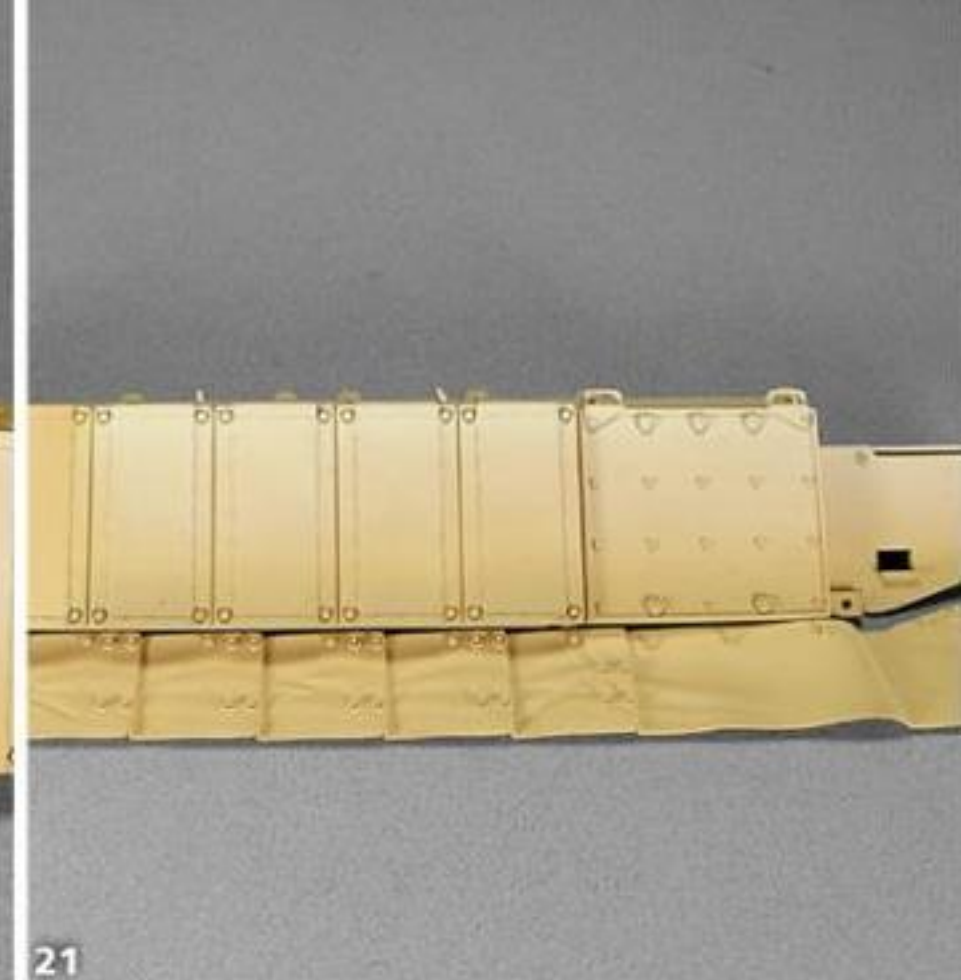
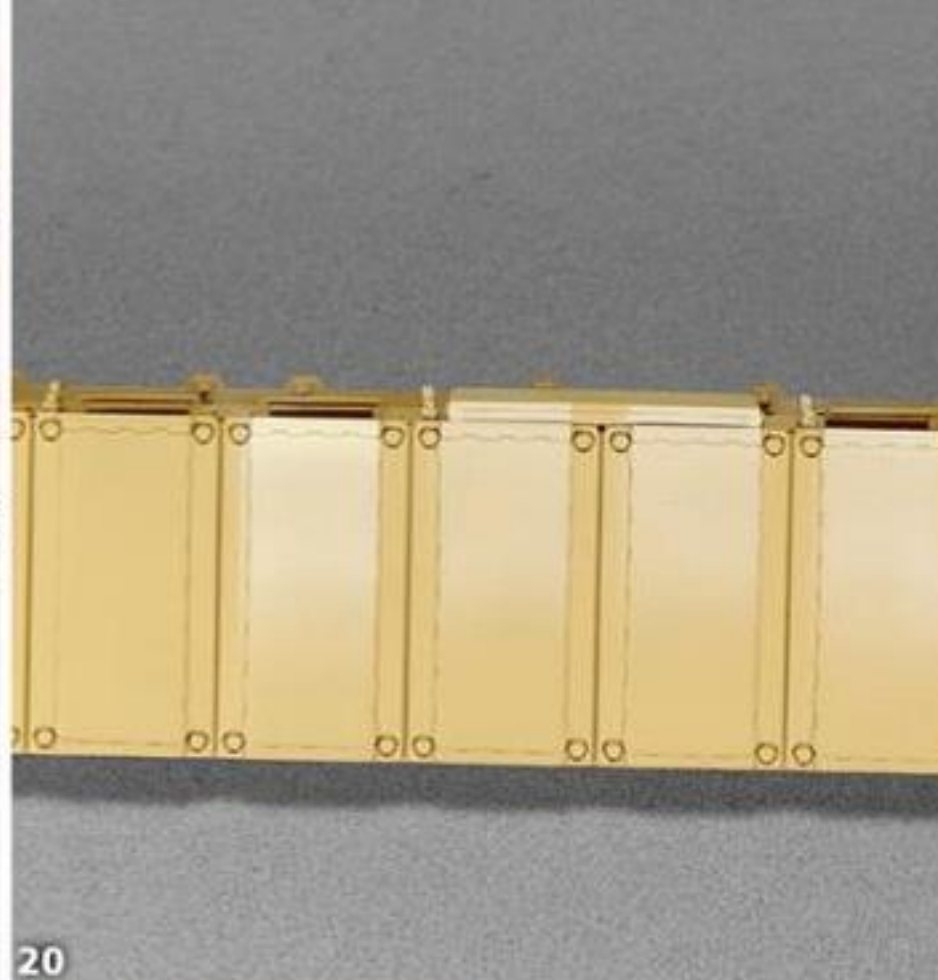
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18



19 20

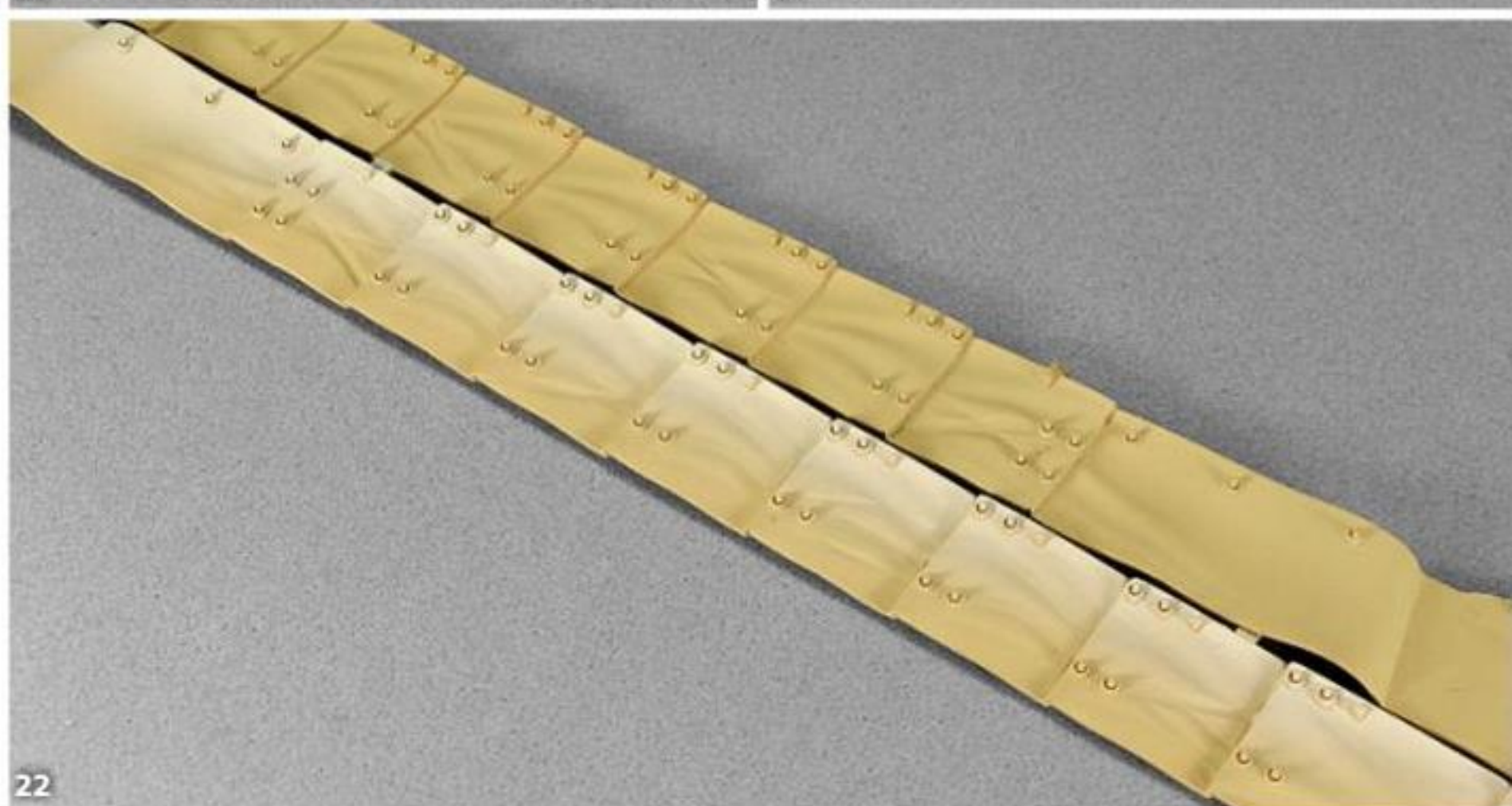


21

(19). On the side skirts, which are totally flat, we can use any type of mask or post-it..

(20). After removing the masks we observe both the lighter upper parts, and the effect obtained by covering parts with the masks, which adds contrast between panels.

(21). When we compare the previous picture with this one, we clearly see the effect of using masks and their potential for creating effects during the modulation process.



22

(22). Throughout the modulation process there is one critical aspect: the angle in which you hold your airbrush to paint the parts. This will be different in the process of lighting and shading. The results are more appreciable on pieces with wrinkles such as these skirts.

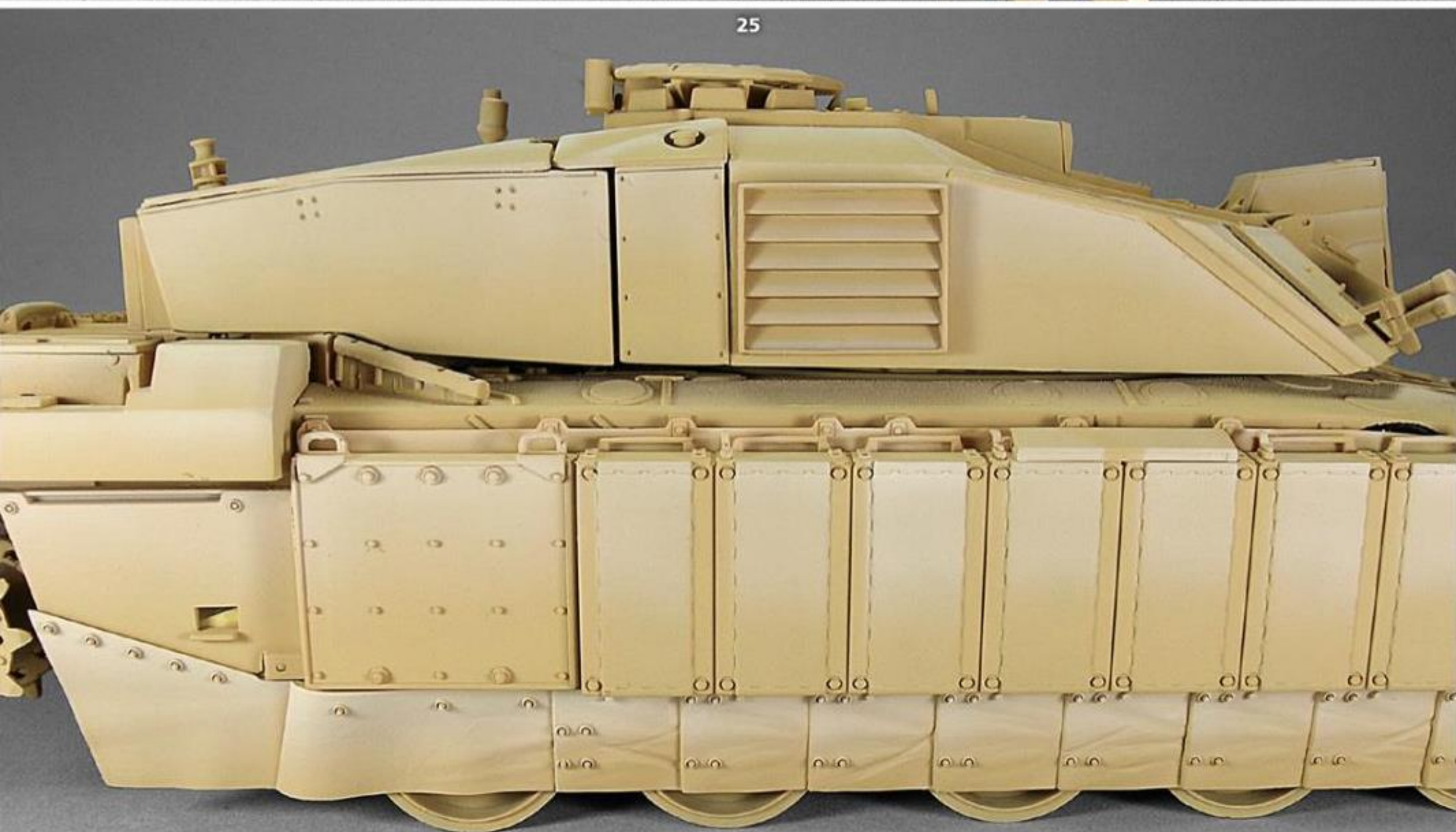


23

(23,24,25). Here you see the finished process. With the shadows we get more contrast and pronounced depth.



24



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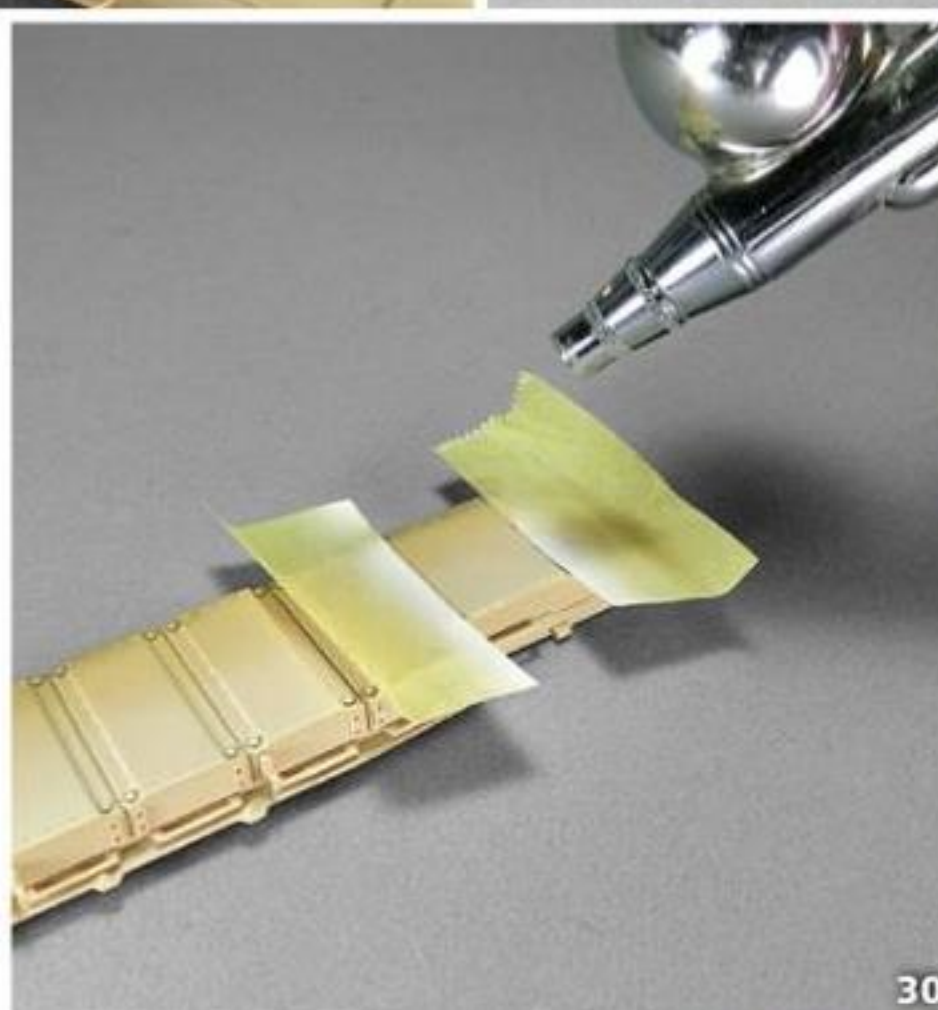
(26). As we have mentioned, the process of shading is similar to that of lighting. The difference is the use of the masks, this time moving away from the light, and in some cases, the angle of the airbrush.

(27). The shading step will add contrast and depth to the model. Nevertheless, we must be careful. We advise to carry out the shading process in thin layers.

(28). In this picture we can clearly see the difference between the lighting process on the right and the complete modulation on the left (more light and shade).

(29). The modulation of the hull has been completed.

(30). On the sideskirts we resort again to masks to airbrush the shadows, with the same airbrush inclination, but on the opposite side of the spots we lighted.



30



31





(31). To apply the shadows on the skirts we must use the airbrush straight, without any angles. This way we will achieve shade only on the lower area of the skirt panels.

(32). The shading process should be the same on all the areas, both small and large.

(33,34,35). Have a closer look at the model after the shading process. We are now ready to highlight some final details using a brush.

(36,37,38). The modulation process enters the final phase where we apply a very light colour to some parts and small pieces, to highlight them. The usual suspects are hatches, hinges, nuts, rivets ...



II.4.2.

CAMOUFLAGED BASES

The camouflage process usually begins with the choice and application of the colour that covers the larger area of our vehicle. You can say that it is the base colour of the vehicle so we will use the same methods we have seen in the previous section.

In that section we have seen how to apply and highlight a base colour. However, in this case this is not necessary. There are modelers who don't highlight any of the camouflage colours.

And that is usually OK. Depending on the combination of colours highlighting will not always be appropriate and sometimes even not recommended, especially when the camouflage involves three or more colours. In these cases we can highlight with subsequent treatments, such as the application of oils or pigments, choosing light tones for them.

Today there are many different camouflages, some of them truly complex, like digital camouflage, or very chaotic, as observed on vehicles in the Middle East or in eastern countries.

Let's learn how to apply different types of camouflage, both hard-edge and diffuse or semi-diffuse. We will use masks, use the airbrush, but we'll also paint by brush.

Obviously, the airbrush and mask combination allows us to create all possible finishes regarding the type of camouflage. However, there is one type of camouflage we can only do by brush and that is the hard-edge camo pattern.



Hand painting

Sometimes it is easier and more efficient to paint a camouflage by without the help of masks.

Sometimes the shapes of a vehicle are so complex that using tape masks or other products becomes a nightmare and won't even guarantee a good result. In such a case we resort to painting by hand.

Either through the use of the airbrush or the brush, although more tedious and demanding with the pulse, results will be better and will require fewer corrections.



After applying a good layer of primer, we airbrush the first camouflage colour. This is the colour that covers that larger area of the model, in this case AK725 Iraqi Army Sand.





2
It is advisable to apply some general lighting since the following treatments always tends to darken the colours. We highlight the base colour with some white.



3
Finally we apply the camouflage tone, airbrushing AK797 Nato Brown according to a pattern of a good visual reference. To highlight these tones we can use the base colour light sand, which also allows us to integrate them completely.



4
As a primer we can use a green that can serve as the base colour for chipping.



5
After airbrushing the whole model with AK088 Chipping Fluid Effects and letting it dry, we apply the base colour. Here we used a mix of different lacquers with a few drops of gloss varnish.



6
Bit by bit, with the suitable tools and some water, we work on the surface to create all kinds of chipping as a result of bumps, wear & tear and the interaction with the environment.



The next step is to airbrush the light colour of the camouflage, as long as this colour covers more surface than the dark ones.

7



Finally, we airbrush the dark colour following a pattern based on visual reference material.

8



When applying this kind of freehand camouflage it is very important to work with a good airbrush and control the dilution of the paint to avoid splashing.

9



Golden tip: before airbrushing on the model, do a test on another surface to check whether you obtain the desired result.

10





(1). To demonstrate painting this camouflage entirely by brush we use a plastic strip that we have primed.

(2). We use AK175 Light Grey Primer diluted with its specific diluent.

(3). The base colour of the camouflage is a light sand which we use to airbrush the entire surface. The new lacquer acrylics are ideal thanks to their smooth and uniform finish.

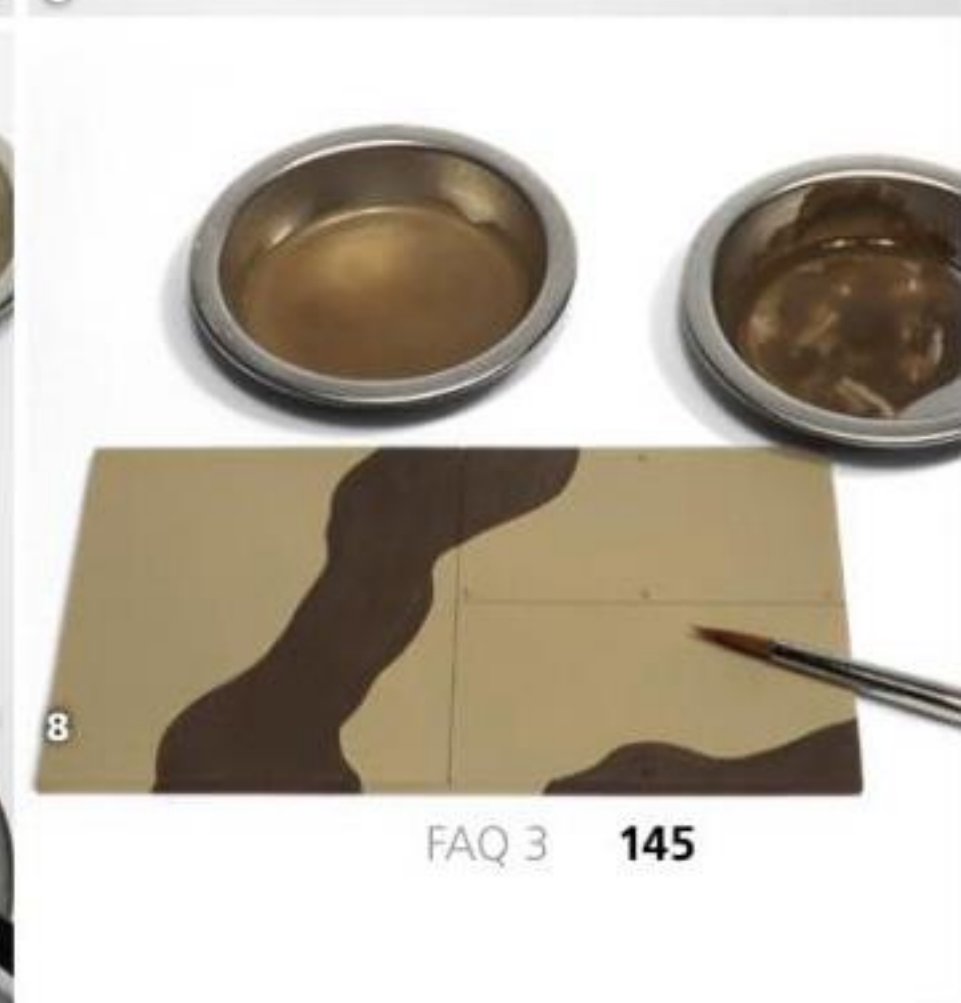
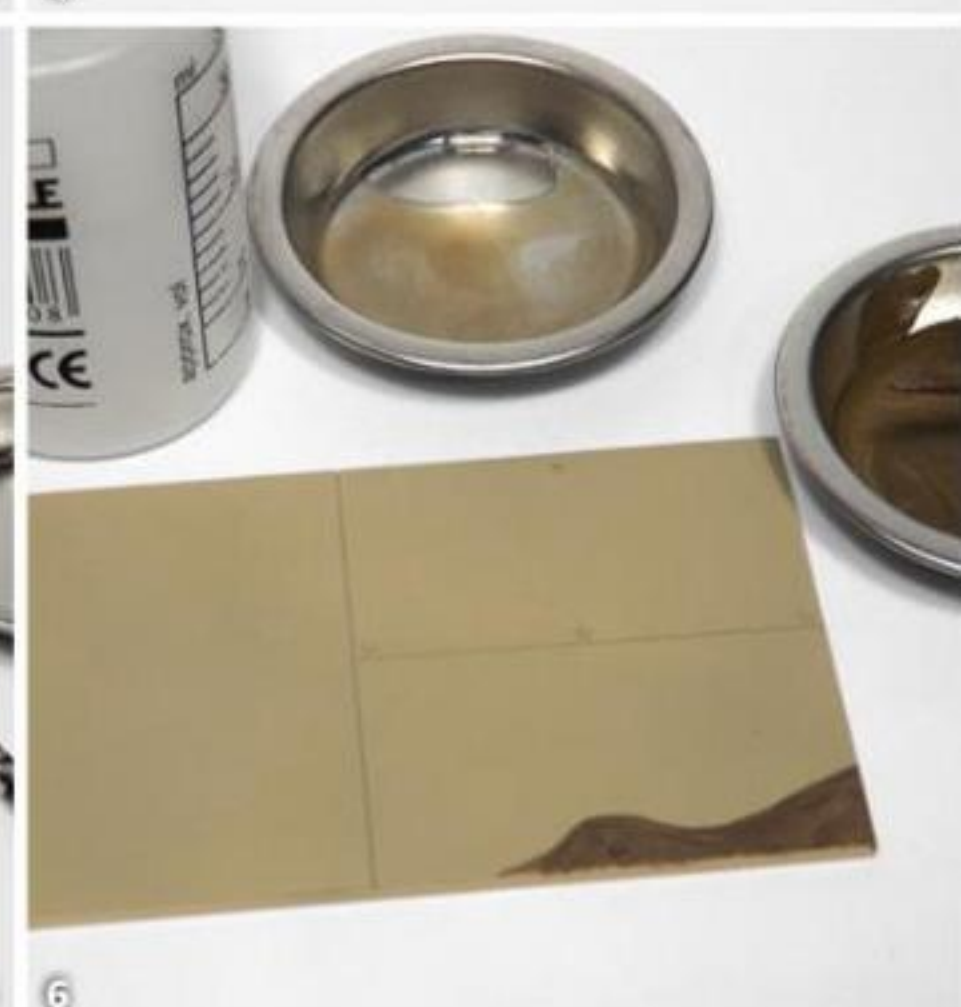
(4). Depending on the application or use, they can be diluted less or more with any lacquer thinner such as Tamiya, Gunze, Gaia and obviously with its own diluent RC702 specifically designed to obtain the best results.

(5). We will need a good brush and a container to dilute the paint. Here we have used a rather dark brown mixture, based on our reference material.

(6). When painting by brush it is best to dilute the paint and to cover the area in successive layers and never in a single one. This will avoid brushstrokes.

(7). Another particularity of handpainting camouflage is having to define the edges and then filling the inside.

(8). Don't worry when you see brushstrokes after the first layers. After the following steps they won't be visible anymore.





1 To apply this type of mixed camouflage we will use both the brush and the airbrush. We will demonstrate the process on a primed plastic strip.



2 We start by airbrushing the dominant colour trying to get a smooth and uniform layer.



3 It is important to find the appropriate dilution to apply base layers with this type of lacquers. A good balance usually is 25-30% of paint with 75-70% thinner. The working pressure is around 1 to 1.5 bar (14.5 to 22 psi).



Next, we airbrush the camouflage tones, drawing the edges first and then filling the interior area, carefully controlling both the air flow and paint, as well as the dilution of the latter.



5 After checking the result we can continue the work with a brush.



Use very diluted acrylic paint with water applied in the necessary layers until the area is completely covered.

6



7



(7). We advice using use good brushes for this type of work. We recommend the Marta Kolinsky ones.

(8). This type of work requires skill and precision, something that is only achieved with good tools and a lot of practice.



8

How to use masks

As we pointed out, whether we use this modelling aid or not will depend on our common sense and the characteristics of the task ahead. As long as the surfaces we need to mask have an easy shape, the use of masks will save time.

Basically, there are two types of masks, rigid and soft ones. The rigid type can be created with adhesive tape, post-it-type paper or even plain paper. For soft masks we can use Maskol or the more recent Panzer-putty.

Masks also allow us to obtain all kinds of finishes in our camouflage. Let's see how we can create some.



The first step will be to airbrush completely the surface with the main color. The dilution of the layers is 30% paint and 70% thinner but we can modify it and adapt it to our way of painting.

If the paint is applied correctly, the surface appears homogeneous and free of imperfections.



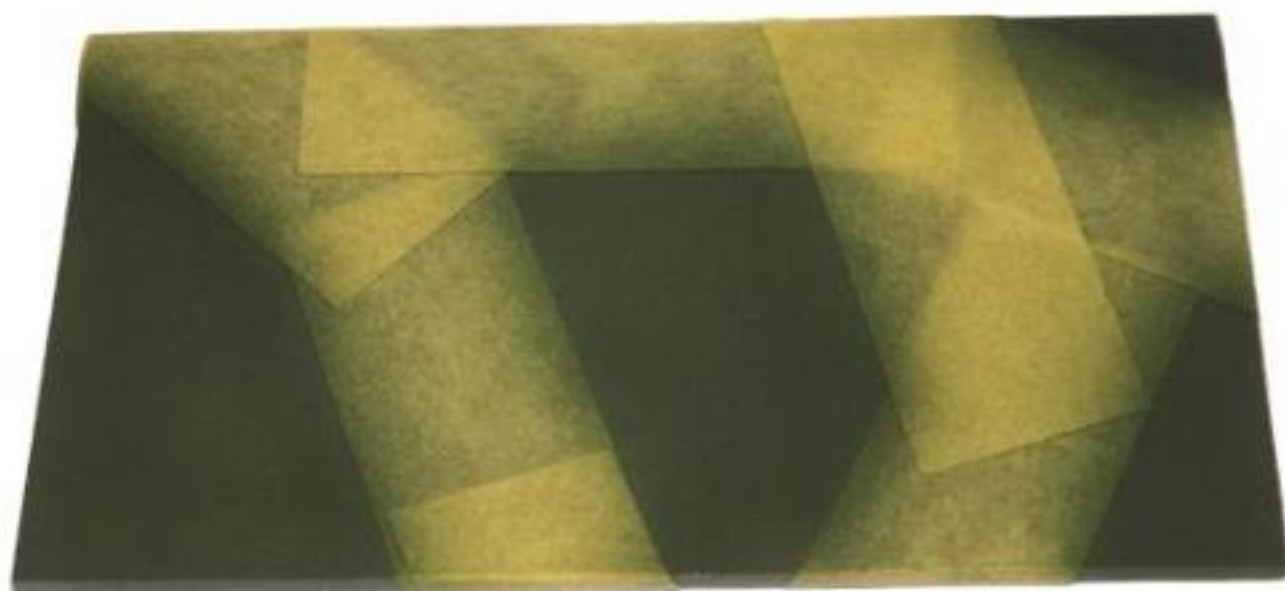
Airbrush the zones left free by the masks with the selected colour. It is best to do this in several thin layers, to prevent paint from filtering under the tape.



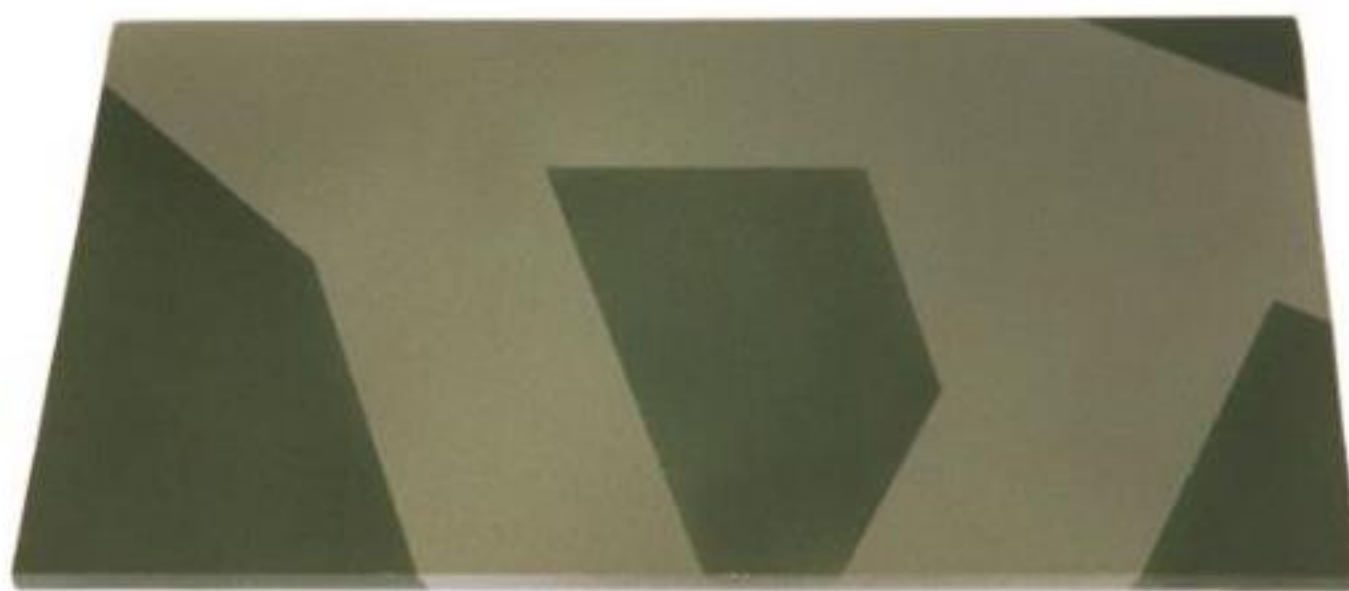
We will use with a plastic chip previously primed.



Next we use tape to mask the areas that we want to protect, only leaving free the areas that we want to paint with the first camouflage tone. It is wise to properly fix the tape to the surface to prevent the paint from flowing under it.



6
After the first part of the camouflage has been painted we let it dry completely ...



7
... and we gently remove the tape to check whether the result is perfect.



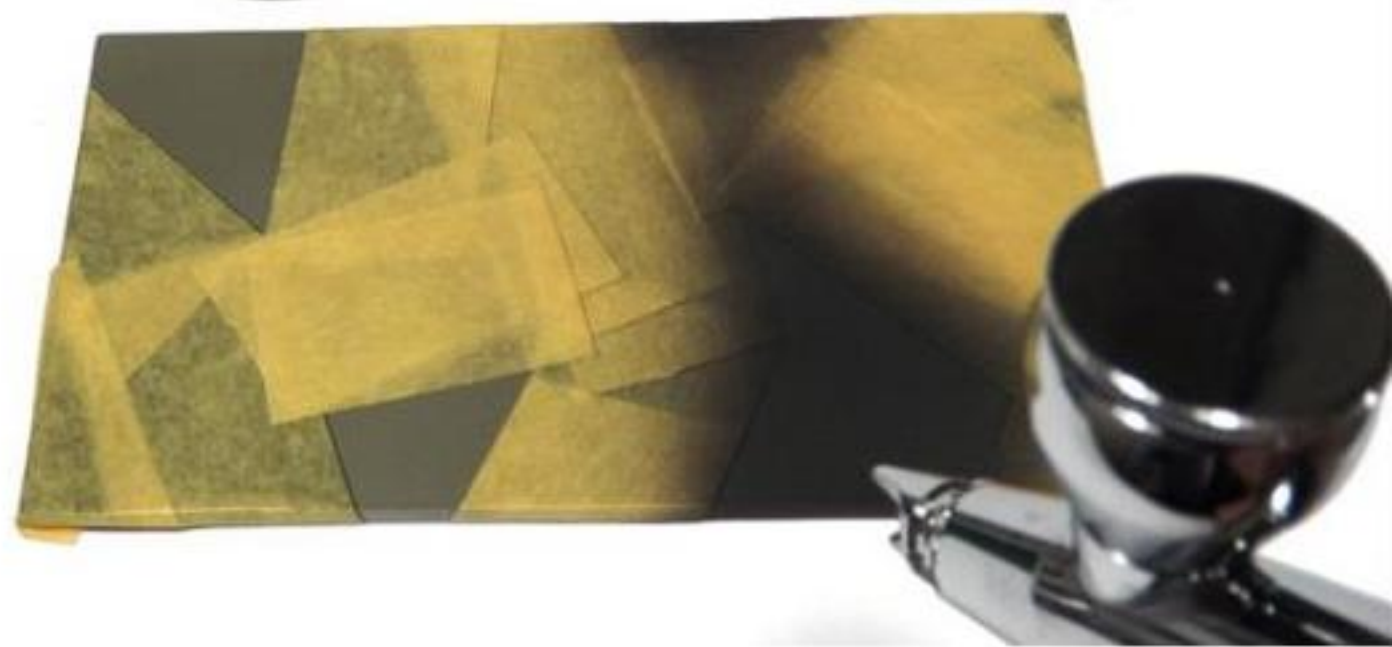
Next we apply another mask to apply the second camouflage colour.

8



We airbrushed again, just like we did with the previous colour, gently and in several layers, so we avoid flooding the surface.

9



After completely removing the tape, we check the result and verify if it corresponds to the references we used. It is a very particular camouflage, easy to apply on this 2D sheet, but quite complicated on a 3D model, requiring time and precision.

10





(1). As in the previous example, we start with a primed plastic strip, using adhesive tape and paper to create the camouflage based on air masks.

The air mask consists of covering the base, but leaving a gap between the mask and the base thereby achieving the effect of diffuse camouflage edges. This lands us in between the hard edges obtained with the conventional brush or mask and the soft edges obtained with the airbrush.



We start by airbrushing the whole base with the dominant colour, in a uniform way.

2



3

With the right proportion of paint and diluent, the result should be a thin and homogeneous layer.



4

To make the air masks we first fix pieces of double-folded masking tape.

Next, with paper, we create the edges over the conveniently located pieces of tape.

5



After preparing the camouflage colour we gently airbrush the area, trying to cover it perfectly. The pieces of tape must be placed correctly to hold the paper and to prevent it from tilting because of airflow of the airbrush.



6



7

We remove the masks with care.



8 The result must be a defined, but somewhat diffuse edge. The height of the mask determines the degree of definition of the edges. A larger distance between the mask and the base will produce less definition. The smaller the distance, the less diffuse the spots will be and the better their definition. It is possible to obtain similar results with Panzer-putty or adhesive tape fixed straight to the base.

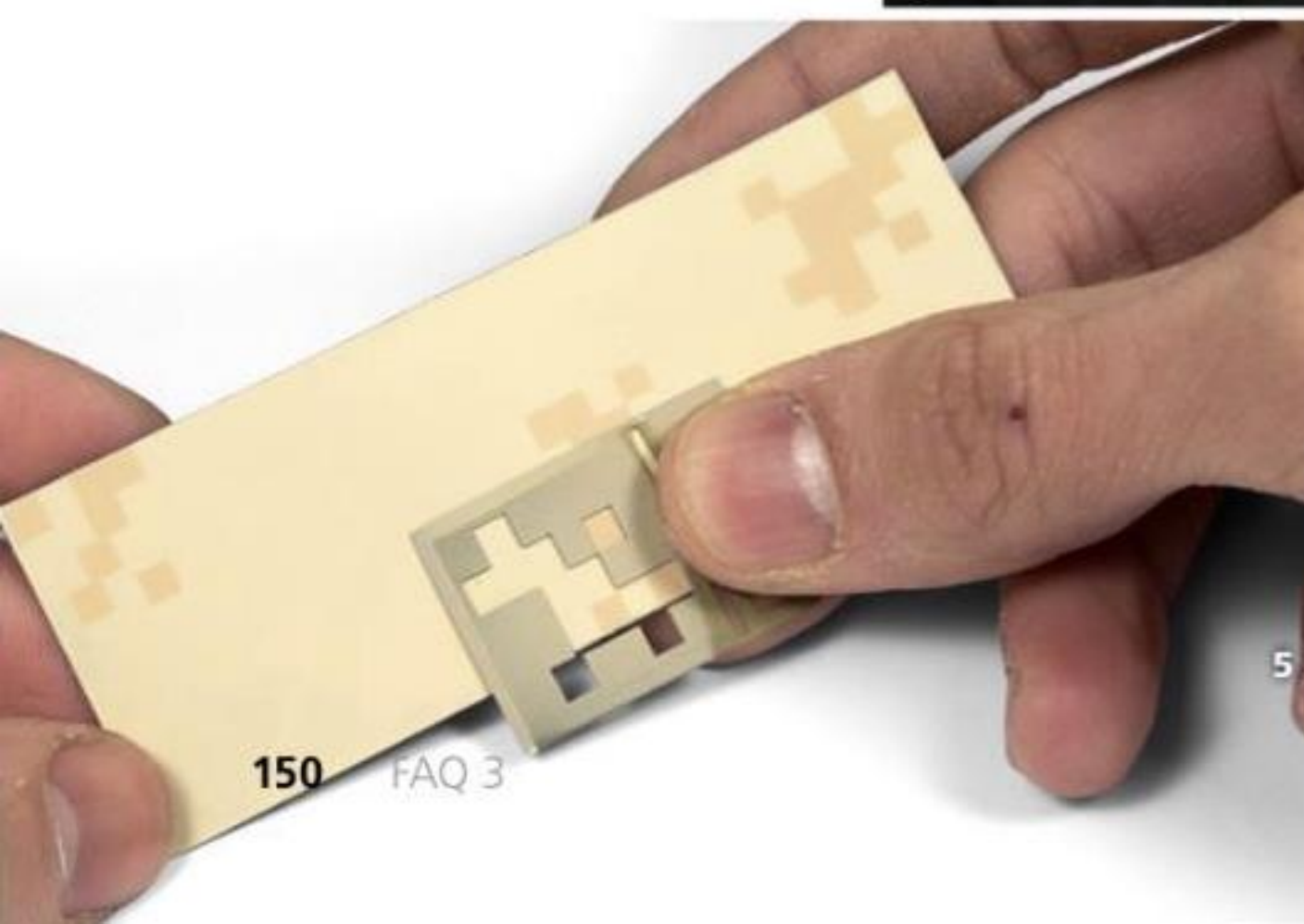
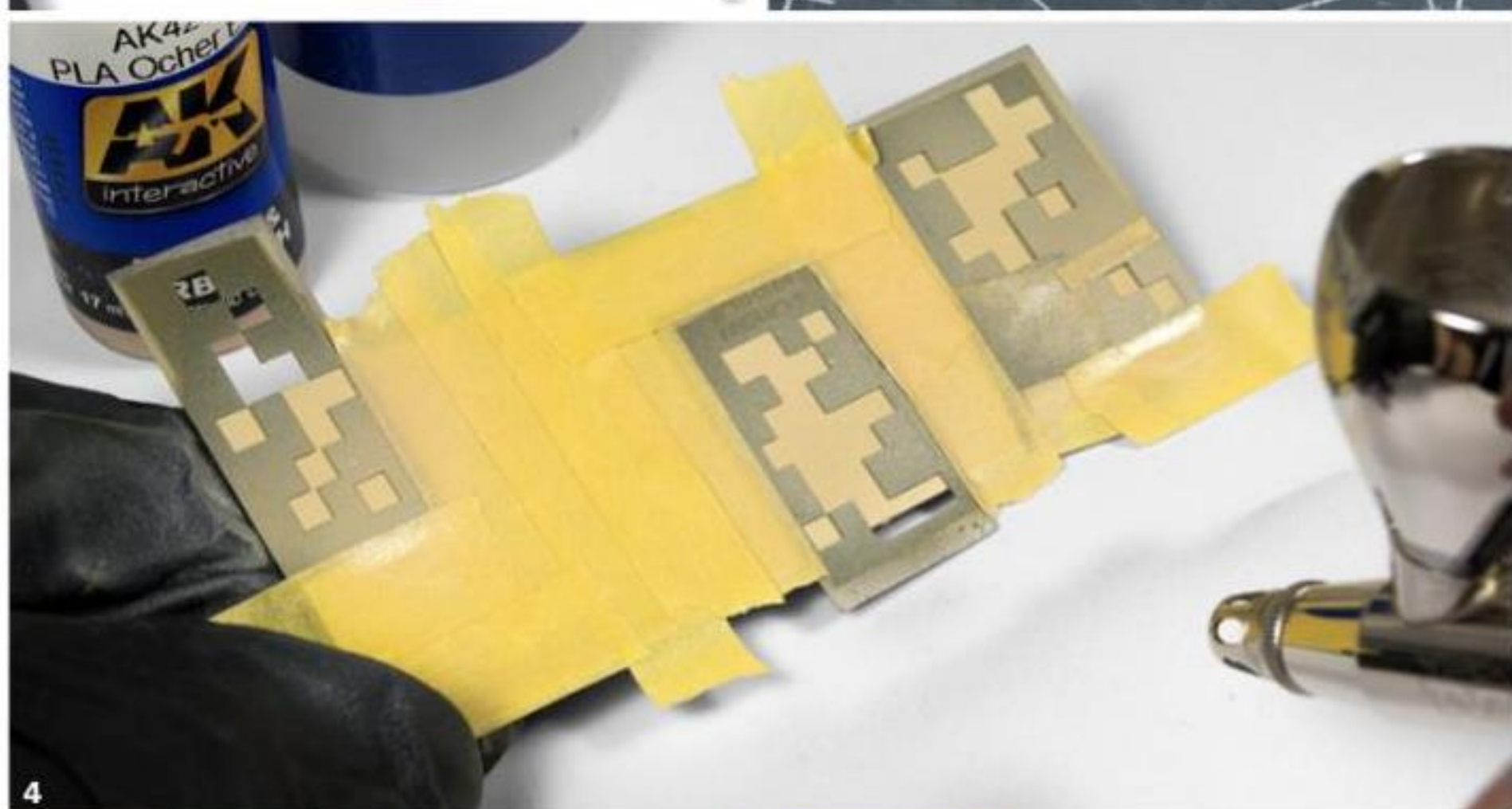
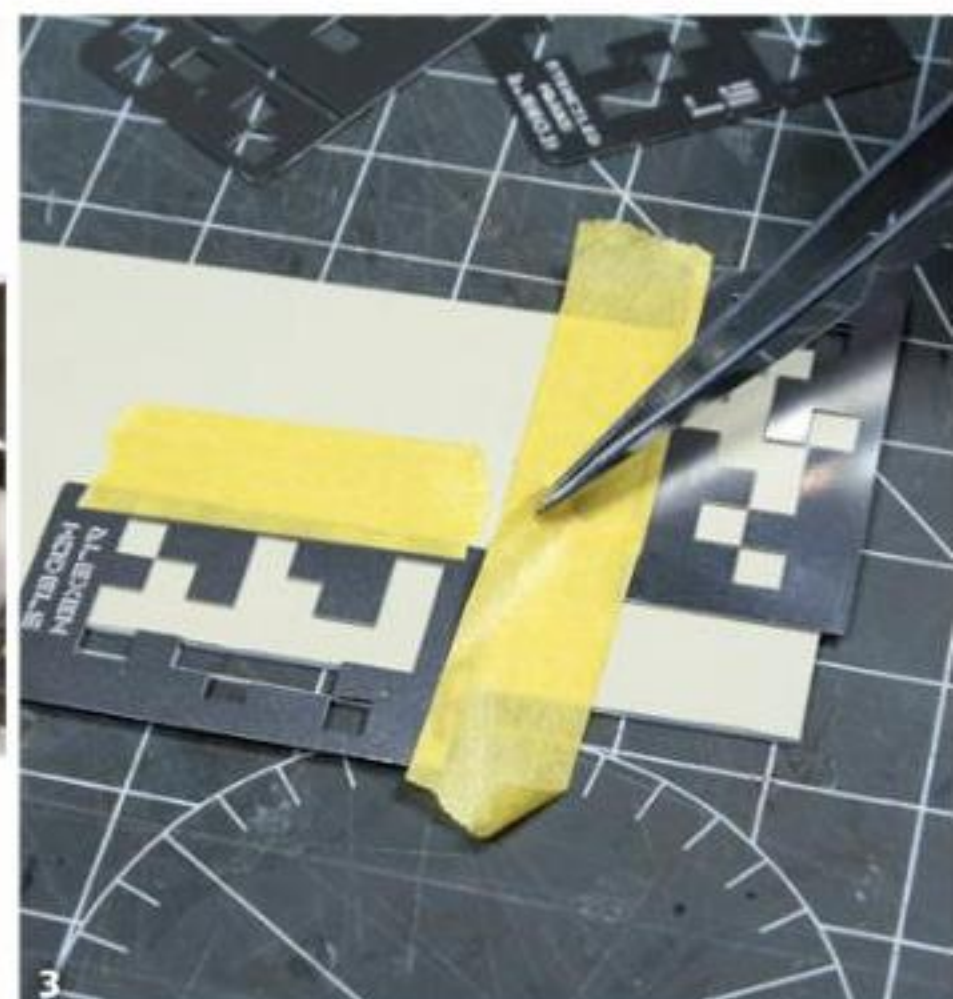


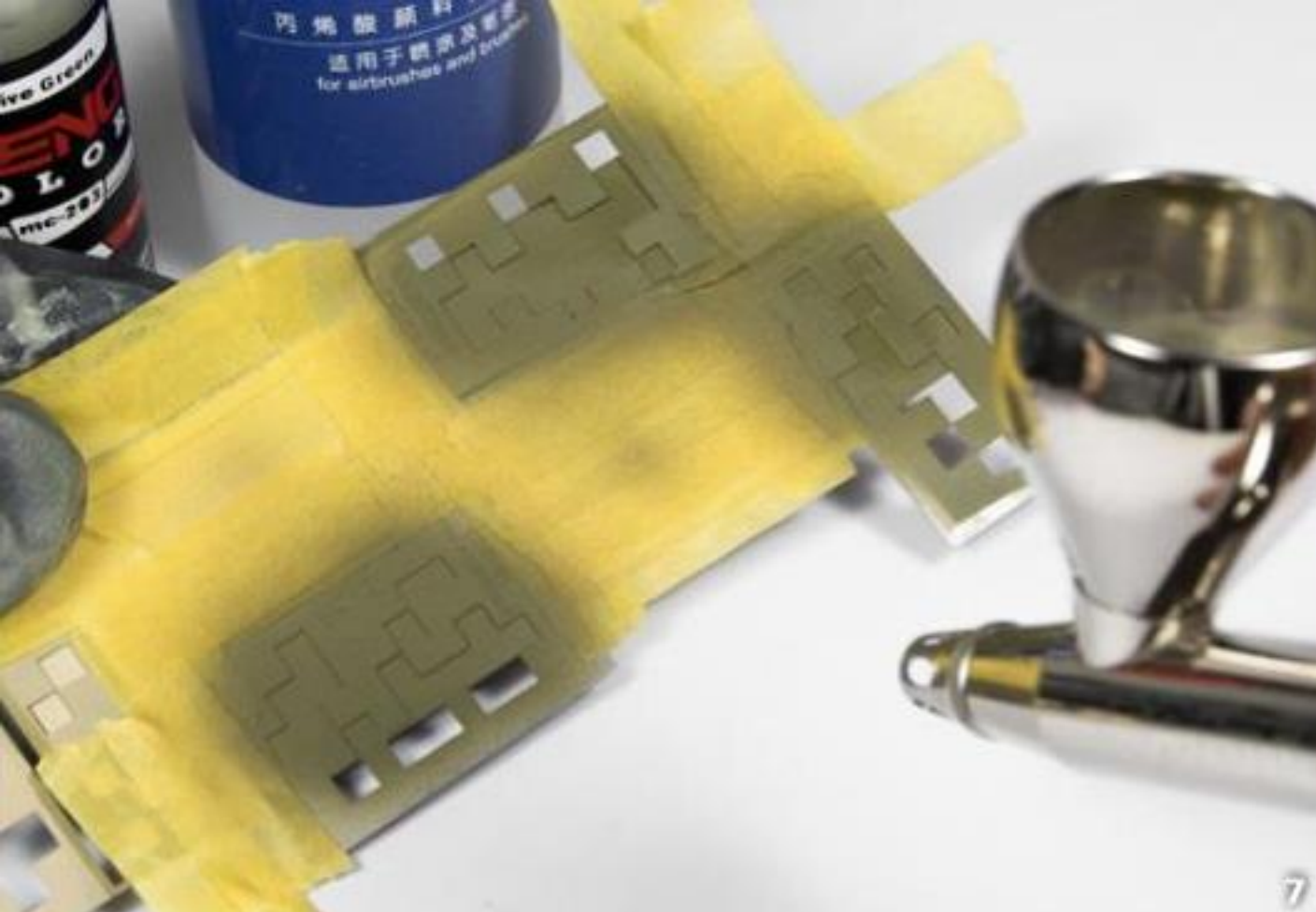
(1). To apply this type of camouflage, somewhat complex at a glance, we advise using photo-etch masks that we can purchase from different manufacturers. Based on what we need to mask, we can find both positive (holes) and negative (spots) masks.

(2). In this example we have simplified the process using a plastic strip. We start by airbrushing the main colour of the model, in this case AK4245 PLA Light Stone. Mix 70% of acrylic paint with 30% of its specific diluent.

(3). Once dry we begin to place the spots (PE templates) according to our visual reference material, always important for these kinds of jobs. Fix the templates with tape and mask the area around it so as not to stain the rest.

(4). Once all the spots are placed in their final position we start airbrushing the next camouflage colour, AK4244 PLA Ocher Earth.





(5). We can also reposition some templates to make certain spots bigger. Again we fix and repeat the masking process.

(6). Finally, we mask again and apply the spots of the third colour in the same way as the previous ones.

(7). It is usually best to paint dark colours at the end. In this case we apply acrylic MC203 Meng's Olive Green, diluted 50% with its specific thinner.

(8). The key to avoid leaks underneath the masks is to dilute the paint thoroughly and airbrush thin layers allowing them to dry after each application.

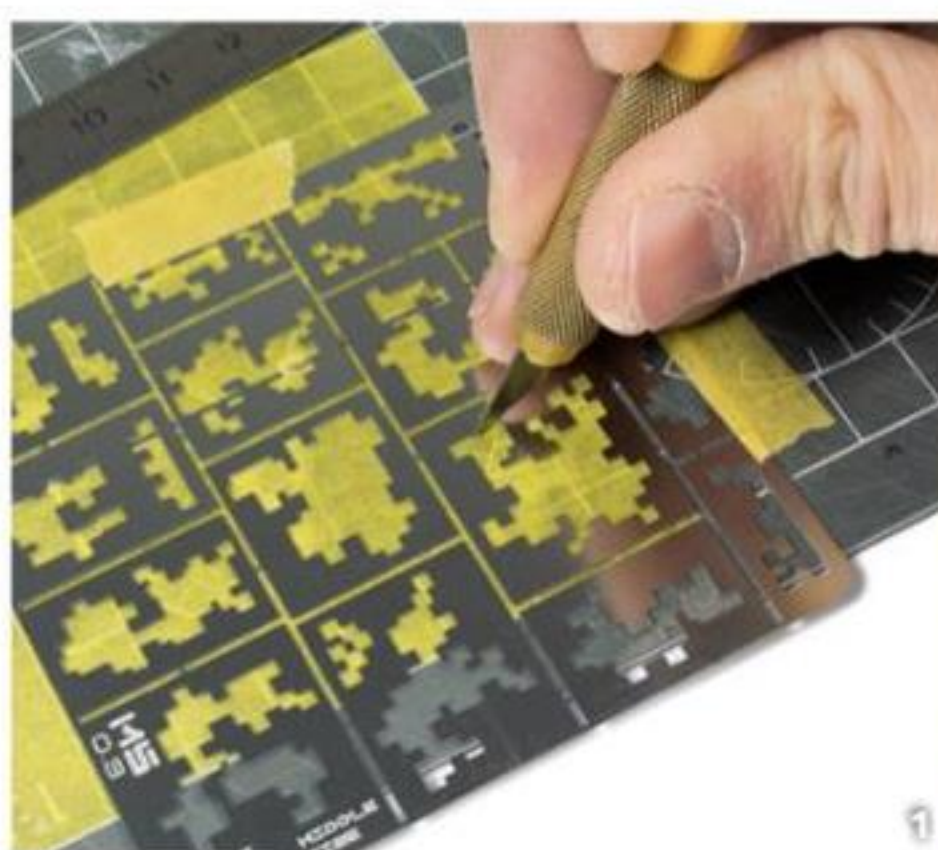


The final look of the camouflage pattern, after applying the decals and varnish, is very convincing.

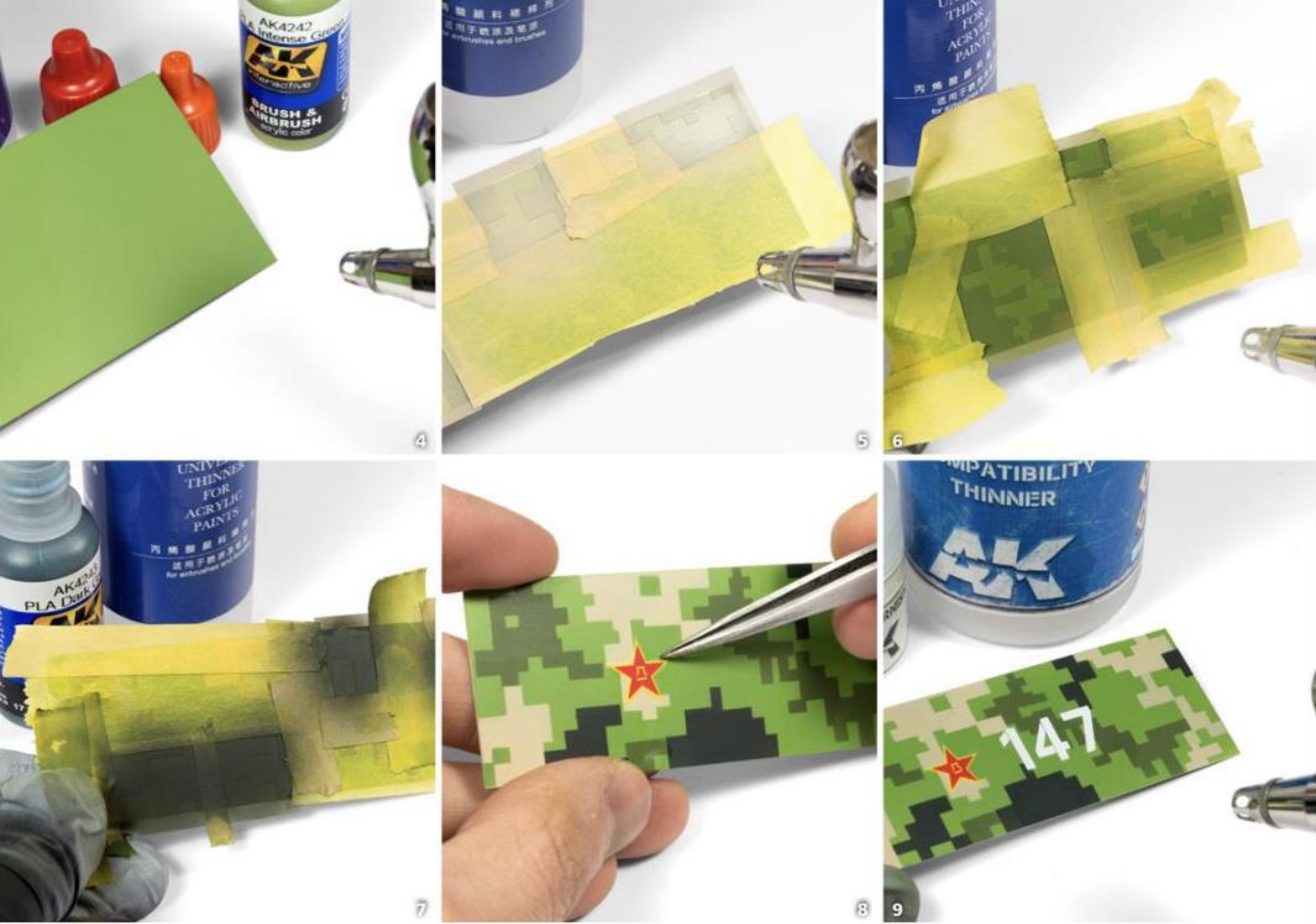


(1). The templates used to perform any of these digital camouflages can be used in two ways: straight application or using them to obtain a negative. Placing the PE template over a piece of adhesive tape we can cut the edges with our blade ...

(2). ... to get the required spots, removing the tape with the help of tweezers, using them as adhesive masks on our model.



The alternative to PE templates are pre-cut vinyl stencils, easier to handle and adapt, with similar results as the previous technique.



(4). This four-tone camouflage starts of with airbrushing the most dominant colour. We use AK4242 PLA Intense Green, diluted with 50% thinner specific for acrylics.

(5). After properly placing the self-adhesive stencils and covering the rest of the surface with tape we airbrush AK4244 PLA Ocher Earth over the said areas, always in thin layers and with the proper dilution.

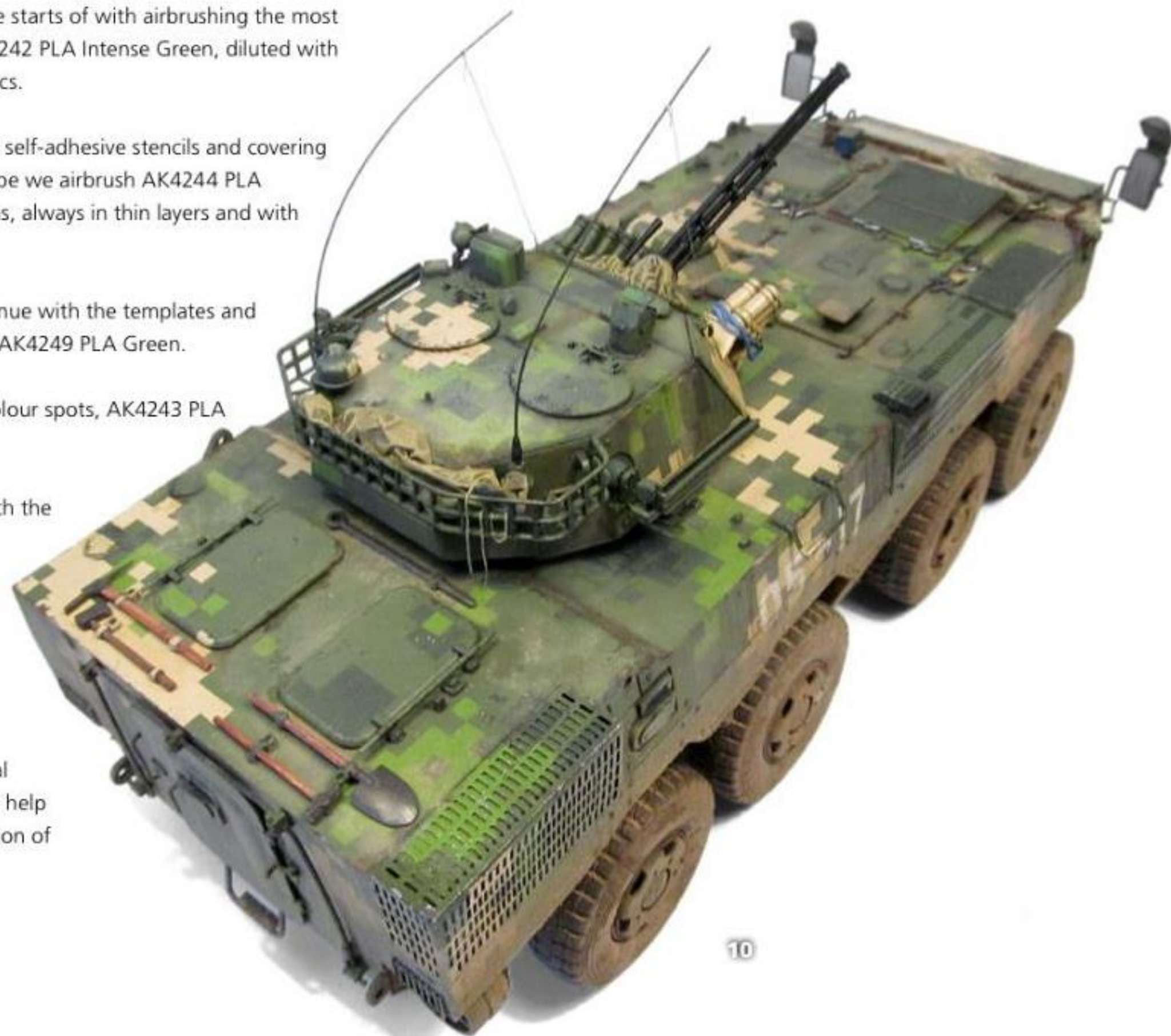
(6). In the same way we continue with the templates and spots of the following colour, AK4249 PLA Green.

(7). We airbrush the darker colour spots, AK4243 PLA Dark Green.

(8). Put the decals in place with the help of some tweezers ...

(9). ... and varnish to seal all the work and prevent it from possible deterioration during the weathering phase.

(10). Overall look of the digital camouflage achieved with the help of masks and a nice combination of colours.





(1). In the world of digital camouflage you can find some very eye-catching patterns, like the one applied to this Panhard belonging to the 1st French Spahis Regiment.

(2). Given that current conflicts develop in greater or lesser extent in populated areas, between houses and buildings, experts are testing and developing new camouflage schemes capable of hiding vehicle silhouettes in these new environments.

(3). As always we begin by airbrushing the dominant colour; in this case a light gray to which a general panel illumination is applied by adding some white.

(4). A NATO green has been used on the lower chassis, but you can use a similar tone as it will be weathered anyway.

(5). To apply the rest of the camouflage colours we use customized masks created with masking tape, as neither the size, nor the shape of the spots is uniform. This process requires a lot of work and concentration so we don't make mistakes when applying the appropriate colours in several phases.

(6). The colours used for the spots are a flesh colour, a yellow green and an intermediate gray, following a pattern obtained from the visual references found on the web and in paper documentation.





As in previous examples we start with a piece of primed plastic on which we apply an urban camouflage. For this we use a mask consisting of a kind of plasticine-like putty that does not dry in contact with air.



We begin by airbrushing the camo base colour, an intermediate gray.

Then, with the putty, we draw the edges of the spots, covering the rest. There are several types of putty on the market with these characteristics. Orange Silly-putty can be shaped by hand and adapted to the surface. This allows the creation of very irregular patterns.



This putty is reusable after airbrushing. The dark gray layer corresponds to the camouflage spots.



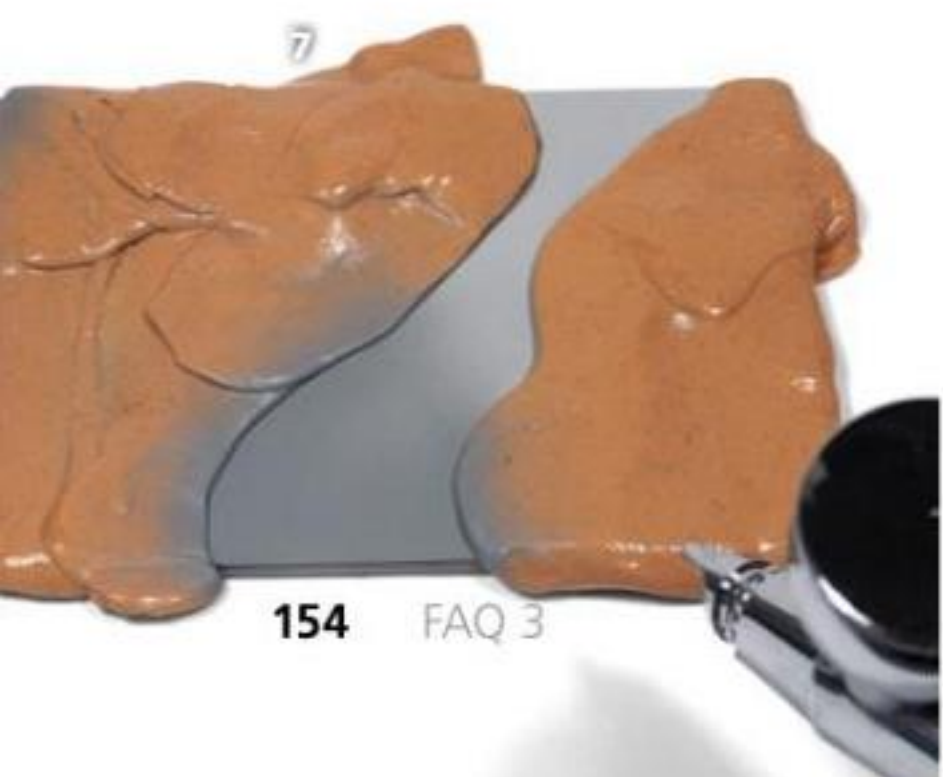
Also, depending on the thickness of the edge of the putty, we can obtain different degrees of definition of the spots, being able to paint diffuse or hard-edge patterns.



To apply the second camo colour we repeat the masking process paying special attention to the areas that must be covered.

Next, we airbrush the second colour, letting it dry completely.

After removing the putty and saving it for its next use (This putty must be devilish!), we have completely finished our camouflage.





After creating some "putty spaghetti", we cut and draw the spots. Apply some pressure to stick it perfectly to the surface.

(1). We are going to use Panzerputty to paint a tritonal NATO camouflage on the cabin of this M1078. In advance we have applied AK796 NATO Green and highlighted with a pinch of AK715 Resedagrün. Perhaps the most characteristic feature of this Putty is its black colour. It comes in a metal canister and can initially be hard and difficult to handle. After extracting a piece from the canister and kneading it between your fingers it becomes soft and adheres to any type of surface completely covering any detail and unevenness. So it's excellent to mask difficult and detailed areas, something quite difficult using adhesive tape or any other means.



(3,4). To correctly draw the contours with the Panzerputty we must follow a given colour scheme or a visual reference, if not we can get seriously lost.

(5). Next we fill the edges of the spots that will remain green. The putty can be stretched and made thinner to conveniently protect the model. Keep in mind that when the putty is warm it is soft and can easily stick to another piece of putty.



(6,7,8). In this sequence we can observe the camouflage from several angles. Before proceeding we should check whether the pattern is realistic because the camouflage for this kind of vehicle is quite standardised.





9

Then airbrush the second camouflage colour without worrying about the putty. It is the characteristic NATO black, for which we have used AK799 diluted with 25% AK712 diluent.



10

It's good to light it up a bit, adding a pinch of AK723 to the black base. Do this to improve the contrast, especially on the roof and between the lower and upper side.



11 12

(11,12). In some reference pics the edges of the spots were darker so we airbrushed a very thin line of pure black outlining all the spots.



13

(13). The next step is to outline the second camo colour with putty, as we did with the first tone. We must maximise our precision to avoid gaps between both colours.

(14). For the second camo colour we prepare a mix of AK797 NATO Brown with a pinch of AK723 to add some highlights. The surface has not been completely covered so airbrush very carefully and control the flow to avoid painting outside the masks.



14 15



(15). The result is a collection of perfect camouflage spots.

(16). Look of the camouflage once finished. The advantage of this kind of putty is that it helps us create this type of camouflage more quickly and easily than with adhesive tape.



16





1
On this Chinese PTL-06 we are going to apply a typical three-tone camo using Panzerputty, but with a somewhat different method than in the previous example. The first step is to airbrush a good layer of primer.



2
Next we will apply the first camouflage colour, a sand orange tone. Contrary to what we have seen so far, we will airbrush just the areas where this colour is present instead of the whole vehicle.



3
On the sand tone we apply the Panzerputty, trying to represent the shape of the spots of this colour, preferably based on reference material. Then we spray the second camouflage colour, green in this case, again over the right areas.



4
We cover the green with putty and prepare our airbrush with diluted black, the last camouflage colour. For masking the gun, which was painted in green, we have used adhesive tape.



5
Touch up the paint with acrylics, if necessary



6
Once we have finished, we remove the masks and we see that the result matches our reference images. This masking method is very reliable and speeds up the painting of all kinds of vehicles.

II.4.3. MARKINGS

Once we have the basic painting completed, we must now take into account the possibility of adding numerous markings to our vehicle.

Although it is not always absolutely necessary, however virtually every vehicle will have some form of marking, although they can sometimes be damaged, covered with mud or hidden under a layer of dust.

These markings may have different origins and be of different types.

Perhaps the most widespread and common are the water-slide decals that we normally find included in most model kits. An alternative to the water-slide decals are dry transfers, these very easy and quick to apply without the worry of 'silvering' as they do not have a clear carrier-film around the actual marking.

As a further option we also have photo-etch and adhesive masks, these can be used to create all kinds of insignia, tactical markings and even distinctive slogans or brand names.

And finally, we can even use a paint brush to reproduce certain freehand markings etc.



Wet decals

Wet decals are included in most commercial models as a small sheet of blue or white color, numbered for easy placement following the assembly booklet.

The decals include an adhesive film, usually gloss, that can cause great silvering problems if certain precautions are not taken.

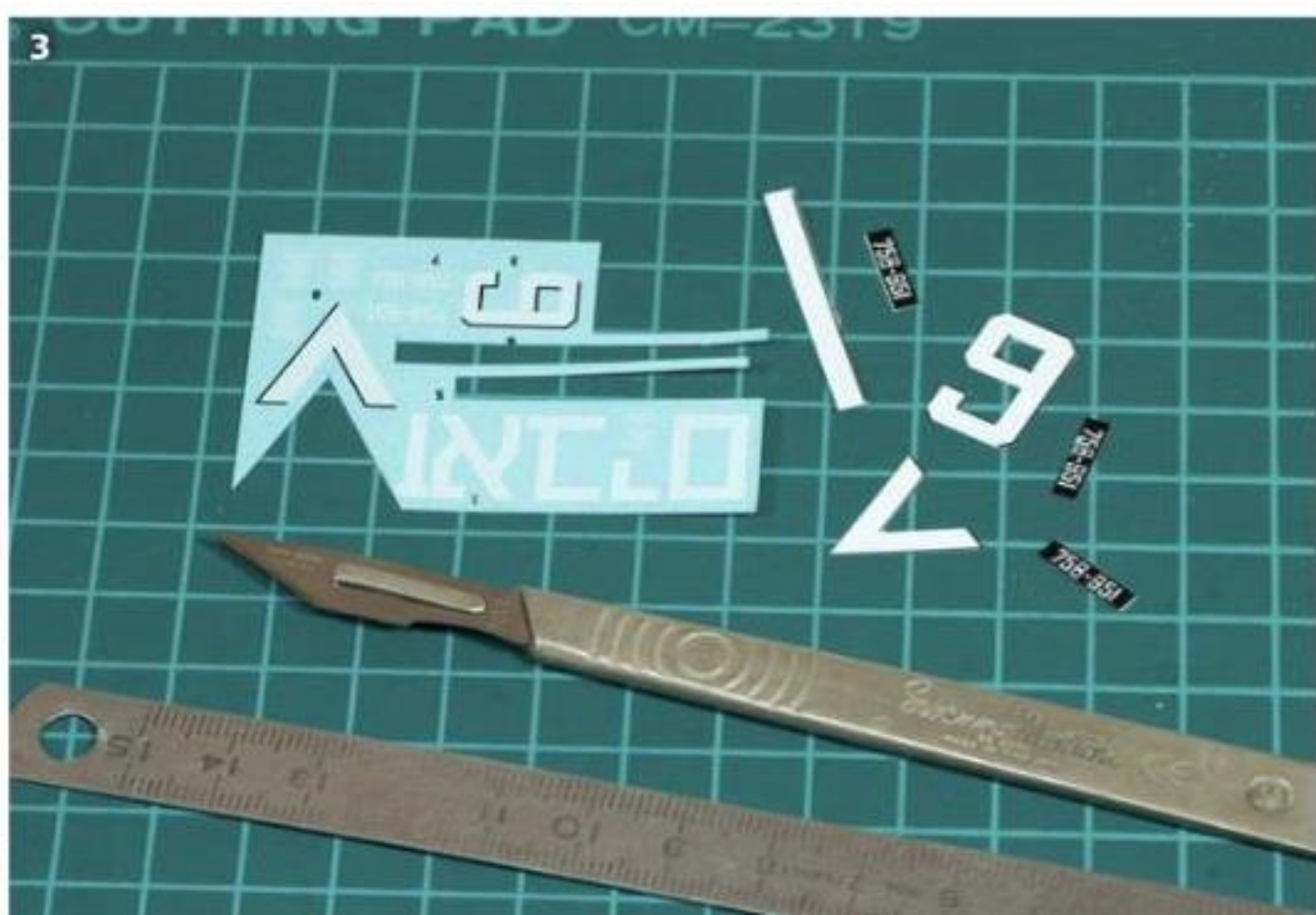
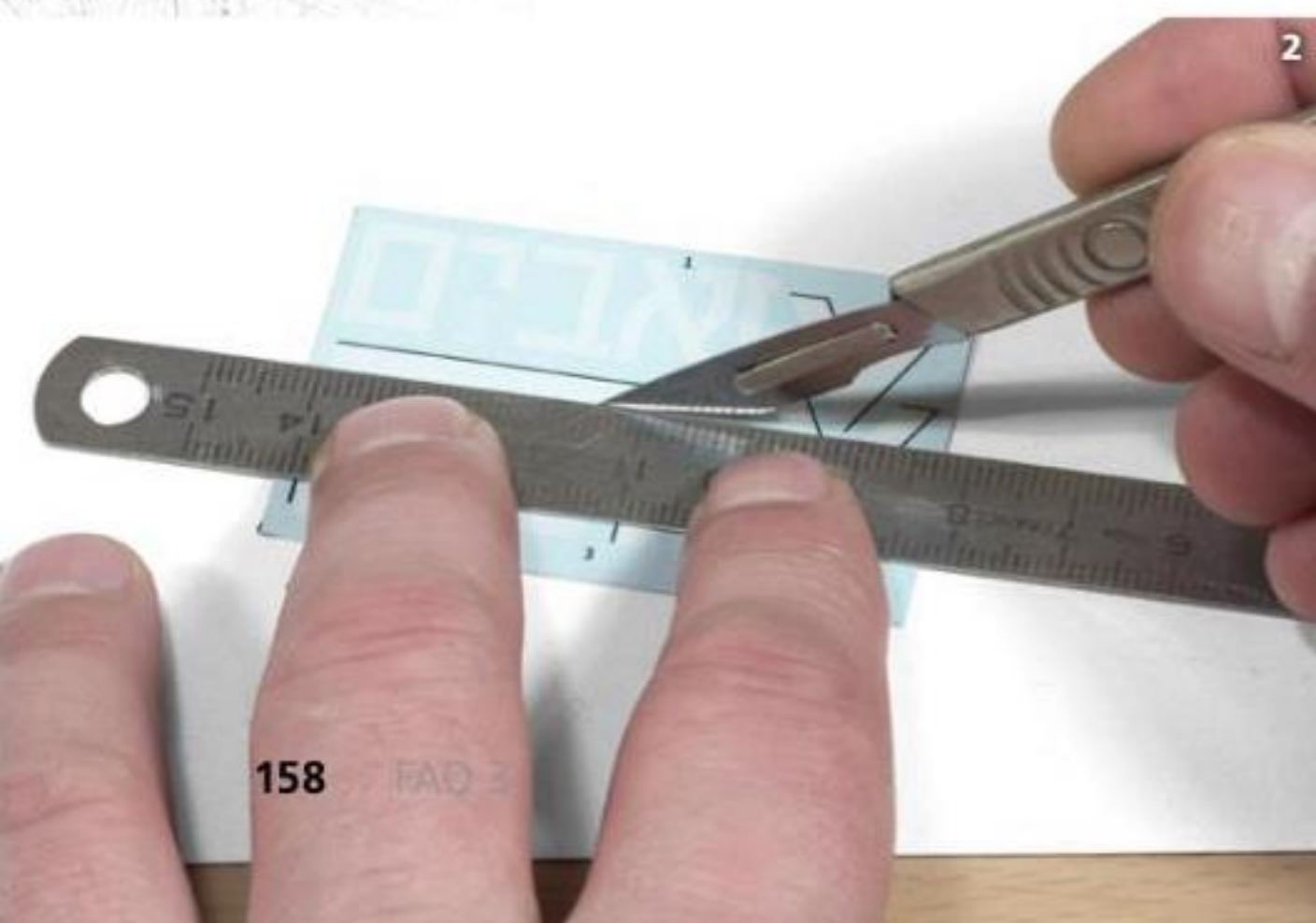
The most important is to airbrush with a layer of gloss varnish the surface on which are going to be placed to prevent the silvering of the decal sheet.



(1). After checking its final placement, we will need a good knife, with a sharp blade.

(2). With the help of a metal rule we will cut the decal out and remove as much of carrier film that surrounds it.

(3). Once we have cut all the decals out that we are going to use and the surface of the model is prepared, we will be able to start the work.





4 With the help of a pair of tweezers we will submerge the decal into a dish containing clean water, until the decal separates from the backing sheet.



5 We then apply a decal setting fluid to the surface of the model with a clean brush prior placing the decal into position. Fine adjustments can be made with aid of a brush. Using cotton swab or absorbent paper to gently dab the surface of the decal to remove any excess water or setting liquid and fix the decal into place permanently.



6 We can use a hair dryer to speed up the evaporation of the water and setting fluid if necessary.



7 Once finished it is advisable to gloss coat over the entire model to protect the decals from subsequent painting or weathering treatments.



8 Although the final finish of the model is to be matt, it's always recommended to apply a gloss varnish over the area prior to applying the decals.



Dry transfers

In contrast to the wet decals we have the decals known as dry-transfers, this is because they do not need water to apply them.

All that we need to do is cut them out from the carrier film, place them on the surface of the model and burnish them on using an appropriate round-tipped tool (rubbing with a pencil or cocktail stick etc), the transfer will release from the carrier film become attached to the model.

The advantage is that the surface does not need any preparation and the paint finish does not have to be glossy. Once applied they can be damaged and distressed with a sharp point (needle, blade, ...) thus representing all kinds of damage as seen on the real vehicle.

After its placement it is best to apply a protective coat of varnish to prevent any possible deterioration due to subsequent weathering processes.



1

(1). Although maybe not as common as water-slide decals, there is still a lot of dry-transfer available to today's modeller offering sheets dedicated to many different vehicles, conflicts and periods. All of which can help depict a specific vehicle from a particular period at a reasonable price.

(2). Note how both the transfer on the bonnet and side of this little Ford MUTT based in Lebanon have been damaged with the tip of a blade.

(3). We can find transfers of any colour and purpose. The absence of film allows us to fix them in places where the use of water-slide decals would be more complicated.

(4). We also used transfers on the side of this Bradley which have subsequently been damaged to represent wear and tear.



2



3



4



"Home made"

Sometimes it is more convenient to do this work by hand, customizing the model with some unique markings.

The addition of these identifying marks is not difficult using adhesive paper, PE masks or even masking tape. Everything will depend on the complexity of the surface to be worked on.

Based on photographs or other visual references and with the help of a computer, we are able to create or adapt any brand or particular decoration to our vehicle, helping to create the ultimate in realism.



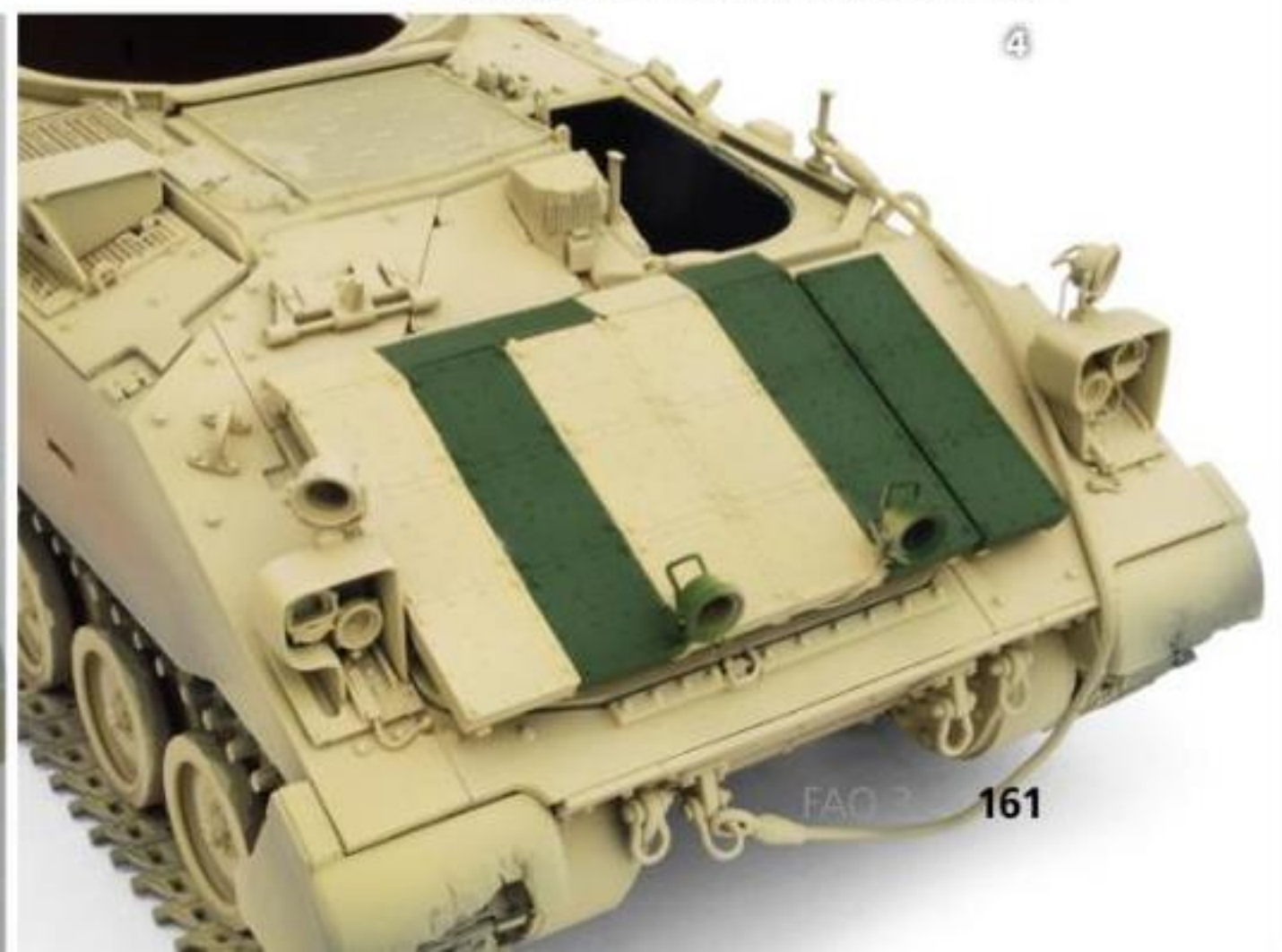
Given the characteristics of this M113 and its slab sides we can add a large slogan. After adapting it to the scale and printing it onto plain paper, we transfer the design onto adhesive masking film, which we will stick on the side of the model.



After protecting the rest of the vehicle with tape, we can airbrush the exact colour needed, achieving a perfect finish and without the need for any further weathering.

Observe how the combination of both homemade and commercial decals and transfers help to highlight our model from the rest.

The identification markings on the front of this Bradley have been airbrushed over in green. Masking tape has been used to protect the surrounding sand colour.





5

In this example, masking tape painted in red has been used to represent the NATO exercise markings on the turret of this German Gepard.



6

On this Merkava Mk.I a combination of identifying marks and tactical symbols have been applied using different techniques. The chevrons on the sides of the turret were painted by hand. The bands on the barrel were sprayed with the help of masking tape and the markings on the front and rear of the hull are dry-transfers.



7 8

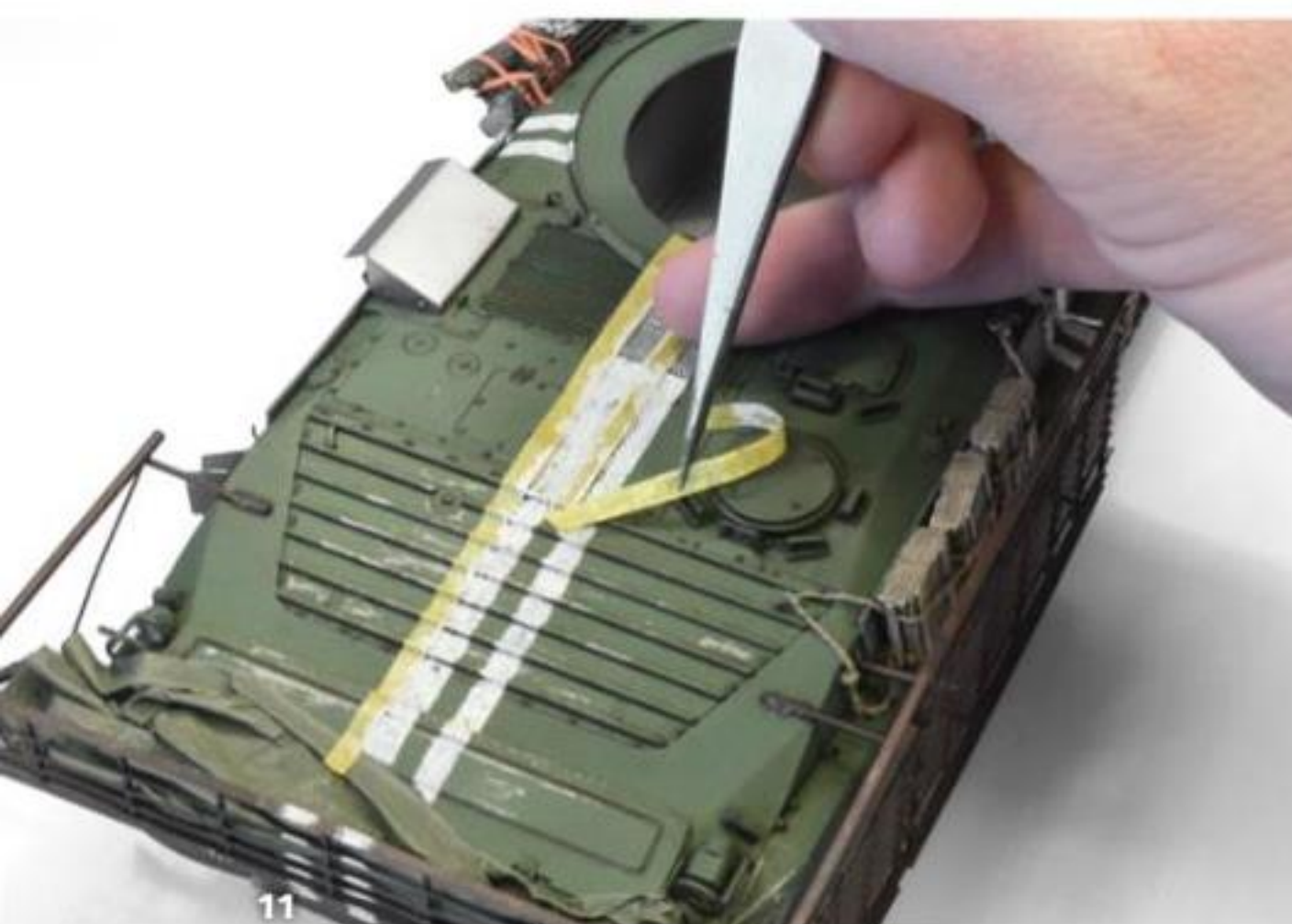




9
An ordinary paintbrush can be really useful by creating the effect of markings that have been hurriedly painted over to hide them before going into battle, such as on the rear ramp of this Bradley IFV. Note the run marks have been simulated using a fine-tipped brush.



10
Finally, let's see how to reproduce some identification bands by hand on top of our vehicle. Firstly we should mask off the areas to be painted and secondly avoid using heavily diluted paint.



11
With the help of a pair of tweezers we carefully remove the tape, once the paint has dried fully.



12
To represent numerals and texts we can use a good brush and all our expertise.



II.4.4. CHIPPING FLUIDS

To accurately reproduce the many forms of paint damage we often seen on a real vehicle onto a scale model, has often proved a real challenge for modellers.

Among these effects we must include scratches and chipping, along with all other kinds of general wear and tear.

Factors such as size, placement, shape or colour should be taken into consideration. Until recently, all we had to use was the humble paint brush, a steady hand and a good imagination. But when we are faced with a model of considerable size, this task becomes never-ending and becomes impossible to maintain a consistent quality.

First we used the 'hairspray technique' as a new way of representing these effects. Not long after, paint manufacturers developed a new range of products, called chipping fluids. This changed the method of work, making it faster, easier and offered much improved results.



Chipping in aluminium

Let's see in the following example the correct method to apply the chipping and how to reproduce all types of defects on the loading area of a truck manufactured in aluminum.



(1). First we must completely paint the area in aluminium. In this case we have chosen to airbrush AK479 Aluminium Xtreme Metal as an excellent base, with a very fine pigment and great adhesion. We apply it directly from the jar without thinning. We clean the tools using AK470 Xtreme Cleaner.

(2). The advantage of Xtreme paints is that they use a specific thinner quite different from the enamel based paints so further weathering will not affect the base in any way.

(3). We must allow the base to dry fully, at least 2 hours before applying the Chipping fluid. There are two types available, the difference being the size of the effects that each produces. AK088 produces small scratches and chipped effects, while AK089 produces larger areas of damage, where large areas of the base colour need to be exposed. In any case they can be used separately or mixed together.

Both are used directly from the container, without any dilution, but given its particular composition similar to a normal hair fixer, has a high superficial tension. This means that when applied onto polished or glossy surfaces it doesn't work as well as on a matt surface.

To avoid this we airbrush in multiple thin layers, allowing them to dry before applying the next. This will ensure that the surface is completely covered with the product. We decided to apply AK088 Worn Effects to the whole rear area in this case.





4



5



6



7



8



9

(4). The process begins by applying a layer of AK796 NATO Green mixed with a pinch of AK715 Resedagrün to soften the tone.

(5). Airbrush some highlights adding a bit of AK2015 RAF Sky to the base colour, spraying in the horizontal and the upper areas of the vertical plates.

(6,7). Finally we apply a thin layer of AK2015 focusing on the base of the cargo deck to get the maximum contrast of light.

(8) Then we will select the tools that we are going to use. It's a good idea to use several types, since the effects they produce are all different and they will contribute to the overall accuracy.

At the very least we should have a brush with hard bristles, a soft brush and finally, a pin, needle or toothpick.

It will also be good to have a water container and a napkin or piece of absorbent paper nearby. It is best to work little by little, focusing on small areas of no more than 2 x 2 cm's.

We start by moistening the surface to be treated with a brush and water. After a few seconds we can get to work. All the processes that we will see can be repeated if needed just re-moistening the paint and repeating.

The effects and results obtained vary and, ultimately, will always depend on the type of paints used for the chipping process. Once the Chipping is done we need to apply some form of varnish to seal the work and protect it.

(9). Use a soft brush to reproduce the small chips. We should continue moistening the surface until the top paint layer starts to lift from the base coat. Drying with a tissue paper when we consider the work to be finished on that area before moving to the next.



10 11

(10). We will use a wooden cocktail stick to reproduce fine scratches and small lines where needed. Once done we will use a soft brush moistened in water to remove any paint flakes remaining.

(11). Use the brush containing hard bristles to produce large chipped areas, always use caution, since the effects are irreversible. It is convenient to work little by little, changing the size of the chips to get the desired results. Finally, as in the previous cases, we will dry the surface to protect the paint

(12). Once the process is finished and after observing that the results are what we were looking for, we will seal the work airbrushing on a layer of varnish. In this case we have used AK776 Satin Varnish.

(13). Allow the varnish to dry and check if the achieved effect is realistic. Next you can continue with the weathering process of the aluminium cargo area. Don't apply rust here!



12 13



Xtreme rust

Continuing on from the basic chipping process we are going to now see how to create the extreme effects seen on a long-abandoned and heavily rusted vehicle. In this example we will work on a T55 with some aftermarket resin parts, such as wheels, external fuel tanks and a turned aluminium gun-barrel.

To begin the oxidation process we need to select our palette of colours with which we will add the rust effects working with the airbrush. A good combination would be to use XF10 Flat Brown and XF64 Red Brown as a base, highlighted with XF59 Desert Yellow and XF15 Flat Flesh, and adding a pinch of X6 Orange for halftones.

Although we could also use the most recent RC067 and RC068 Red Brown, RC081 NATO Brown and RC035 Brown as a light base with RC093 B Sand Yellow and RC102 SRG Desert Yellow, with a drop of RC009 Orange for medium tones.

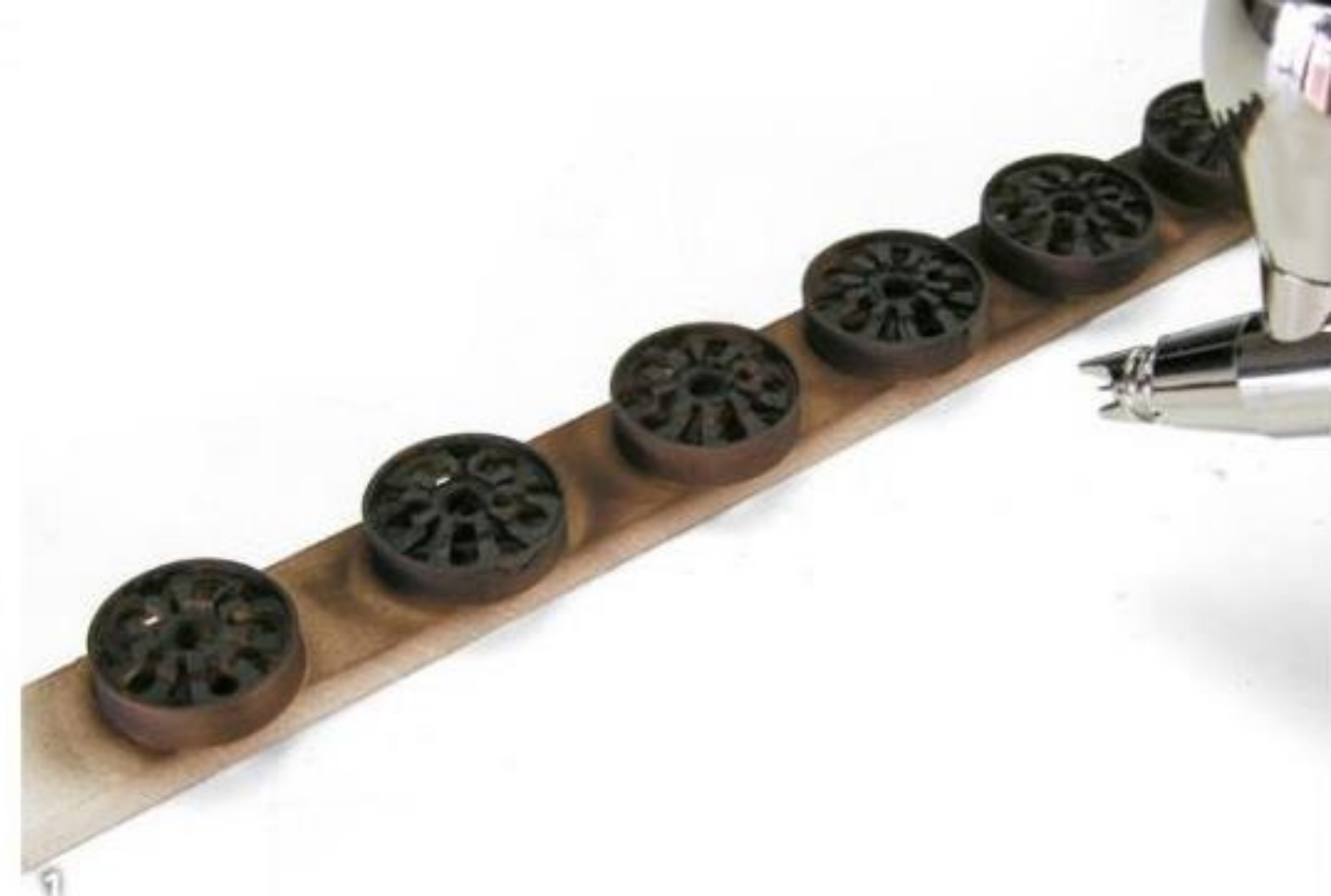
(1). With a dark mixture of these colours we airbrush the inside of the wheels and the other less visible areas.

(2). With the same dark rust tone, we airbrush the lower portion of the hull. It is not necessary to completely cover these areas, since it allows for interesting and useful tonal variations later.

(3). Next, we lighten the base colour to apply highlights to some of the external areas and therefore adding an illuminating effect.

(4). How we can observe the resin has not been primed. The reason is that its yellowish color allows to obtain orange tones when airbrushing the oxide colors irregularly and we can get this effect without covering the piece completely.

(5). Here we can see the basic rust effects in place on some of the accessories.





(6,7). We are painting a vehicle with a base coat of green, to which we want to give the appearance of abandonment. It's really important to have good visual references to study.

The appearance of vehicles with these characteristics is such that they present areas with orange and red tones, showing rust effects in the centre of the panels that diffuses towards the edges. To imitate it we will airbrush using the colours mentioned above, trying to mimic this pattern, without covering the surface completely.

(8,9). Although the distribution of the rust is random, reference photos usually show distinctive and similar patterns.

(10). In the case of the gun barrel we use a darker colour to perform a pre-shading on the bottom of it.

(11,12). In the end the look of the turret must match the rest of the vehicle, although visual references can sometimes show really odd contrasting combinations. In our case, we add a layer of dark rust onto the sides and the hatches, while the roof retains more green paint. In addition, the upper part of the gun barrel has a more orange rust tone.





13

Before continuing with the rest of the vehicle, we can add some small details observed in the reference photos, such as painting the end of the barrel, where the fume extractor has been removed with Xtreme Metal AK476 direct from the bottle.



14



15

(14,15). Then and after applying AK088 Worn Effects, we mask and apply a layer of dark red. Finally we add some random scratches and chips.



16



17

(16,17). All the time we are adding details the appearance of the vehicle improves.



18

(18). In this photo you can see how the gun barrel, broken search light and the absence of the protective dust cover over the mantlet all help to reinforce the derelict look and the appearance of abandonment. The absence of rear auxiliary fuel drums it is also very common.



19



20



21



22

(19). Before continuing with the following steps we must protect some areas, like the engine compartment using tissue paper and liquid mask applied with a wooden stick.

(20). Prior to the application of the base colour to the vehicle we apply a couple coats of AK088 Worn Effects.

(21). We must completely cover all those parts or areas that will receive the same treatment, in this case the whole vehicle. To make sure that the fluid covers the surface completely we will apply a thin layer first. The following layers grip one this one easily. This is more critical when applied to satin or glossy surfaces, so we must pay special attention in these cases.

(22). Once the chipping fluid is touch-dry we can commence airbrushing the next colour.

(23). As paint tends to remain in the nooks and more inaccessible areas, we should focus on the areas, while on the most exposed areas, where the paint will deteriorate faster, thus showing the lower layer of dark brown.

(24). Let's see the result of the process of chipping on the turret and the tools used, mostly hard bristle brushes using varying degrees of pressure.



23



24



(25,26). During the application process of the base sand colour, we need to make sure we apply a solid coat to those areas where not much paint will be removed.

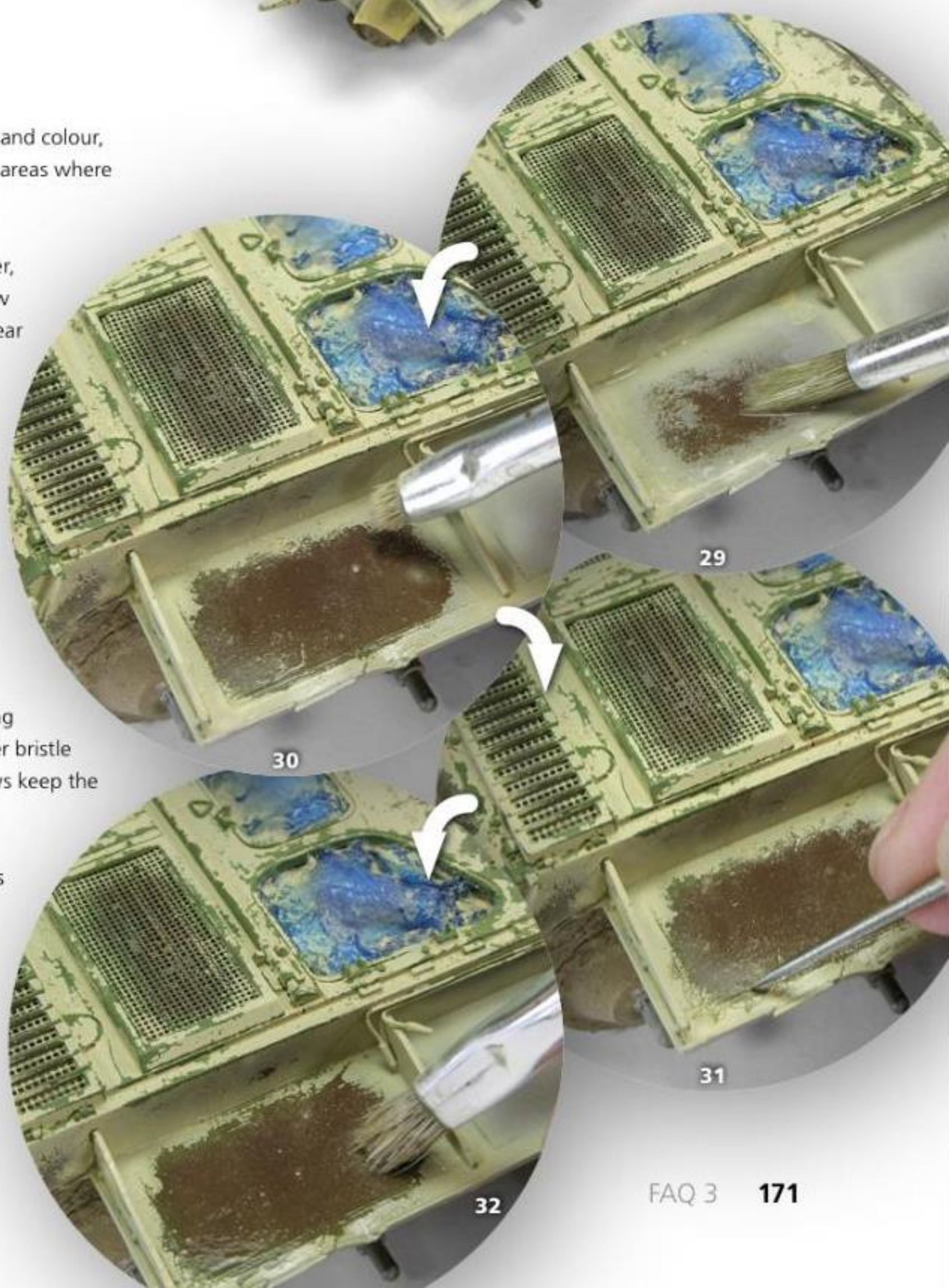
(27.28). On the contrary, we will apply a thinner layer, allowing the dark brown of the previous layer to show through on the areas that suffer from the severest wear and tear

(29). The chipping process is very simple, but we still need to go careful, especially on areas with little paint, as the effect is created more quickly than on areas with thicker paint. We should always begin to peel the paint from the centre of the area to be treated by moistening and rubbing with the help of the brush little by little until the paint starts to lift off.

(30). As we get closer to the areas with more painting we will require more effort to remove it. Using shorter bristle brushes we will remove more amount of paint. Always keep the working area wet

(31). Next we will use a needle or pin to add all kinds of fine scratches and scrapes

(32). Finally, with water and a clean brush we will remove any remnants of paint that have peeled off during the chipping process.





(33,34,35). As you can see in the photos, the range of effects that can be obtained with the chipping fluids and the proper tools are difficult to depict using just a brush.



All the painting work done in this T55 has been obtained just with the use of the airbrush and the chipping fluids.

Actually this is only just part of the weathering work on the base paint of the vehicle.

Although extreme rust will be the result of the application of more steps and the subsequent weathering will be explained in part IV of this volume, the work done its interesting to try to depict a vehicle in these conditions.

A vehicle out of service by these circumstances is always a challenge that begins with the application of the base painting.









II. TECHNIQUES



CHAP.: 5

Filters

Throughout this and the following chapters, we are going to address the application of basic weathering techniques. We generally follow a set of guidelines regarding the common application for many modellers. Despite of it, sometimes this arrangement is altered and even some phases can be repeated due to the needs of the model or even the way of work of each modeller.

All this work is based on a flow chart that appears in chapter 3 of the book, as it is dedicated to the complete process we use to weather vehicles.

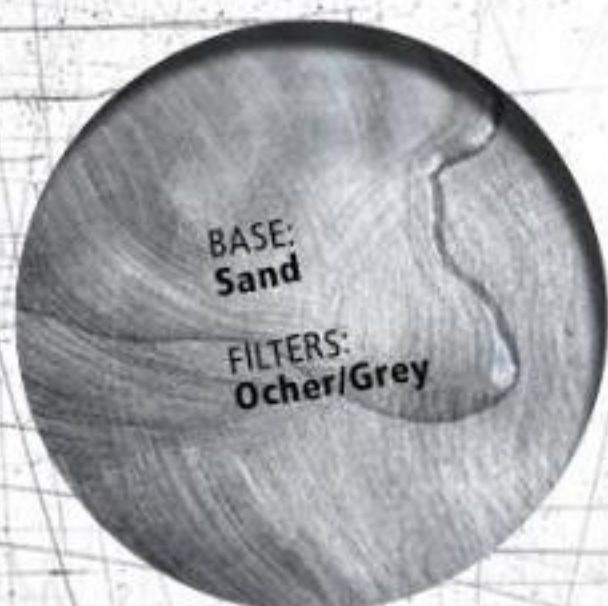
At the time of applying each technique, different colours will be suggested depending on the base although in many cases this choice also depends on our personal taste and the results that we wish to obtain.

Covering all possible base colour combinations is practically impossible, so we have selected just four base colour schemes; Sand, green, sand and brown and finally NATO three-colour camo. With these we more or less cover the whole spectrum of effects most commonly seen.

To begin we will try to see what are the most appropriate filters and their behaviour on these four bases.

II.5.1.

FILTERS ON A SAND BASE



In the following examples a plastic chip has been used to ensure that the results obtained will be similar to those obtained on any model kit in terms of behavior of the painting and technique used. The color chosen is RC104 Iraqi Army Desert Sand as it's a light sand tone but it would be used any other. The whole surface is airbrushed with this tone.



2 On the left side an ochre filter AK261 is applied covering the surface and trying not to flood it.



3 Once it has dried we check that the sand colour turns into a ochre orange tone. Its intensity will depend on the intensity of the filter applied as we can repeat this step until we get the desired result but always respecting the drying times between each layer

4 AK4161 Grey filter is applied on the right half in the same way as the previous one



5 Comparing both halves you can see that the simple application of a filter does completely change the look of the light sand base. While the use of ochre colours turns the base towards orange tones and with rusty appearance, the use of greys adds a more used and dirty look.

II.5.2.

FILTERS ON A GREEN BASE



- 2 On the left side a green filter is applied, AK4162 Light Blue, the same way as in the previous example, but without flooding the whole area.



- 3 Once dry it is observed as the green acquires a cold and pale shade bleached by the sun, also losing uniformity and increasing its chromatic richness.



- 4 A reddish-brown AK076 filter is applied on the right side.



- 5 Once the brown filter is dry we can see that the green on the right half becomes warmer and slightly darker, such as we would see in wet environments. Comparing both halves it is clearly visible how the choice of filter changes the appearance of the green base according to our needs.

II.5.3.

FILTERS ON A DAGUET OR SIMILAR BASE



1 This combination of sand and brown desert camo is quite quite common and is currently in use with many nations. We have used RC101 Egyptian Desert Sand, RC040 Light Stone, which can lighten by adding a drop of white or even RC014 Buff. For the brown areas we can use colours, such as RC034 Brown, RC074 Dark Brown or RC081 NATO Brown.



2 On the left side we use the same AK261 Ochre filter already applied on the sand base as seen in our first example.



3 The result is that both browns become warm and with a somewhat orange appearance.



4 On the right half AK4161 Neutral Grey filter is also applied as used in the first example.



5 After letting both filters dry, the main difference we can see, is that the right half exhibits a cool due to the use of greys. Where as the left displays warmer tone due to the ochre filter. All this will allow us to manage and modulate the colour according to our needs and adapting the model to the environment for better results.

II.5.4.

FILTERS ON A NATO BASE



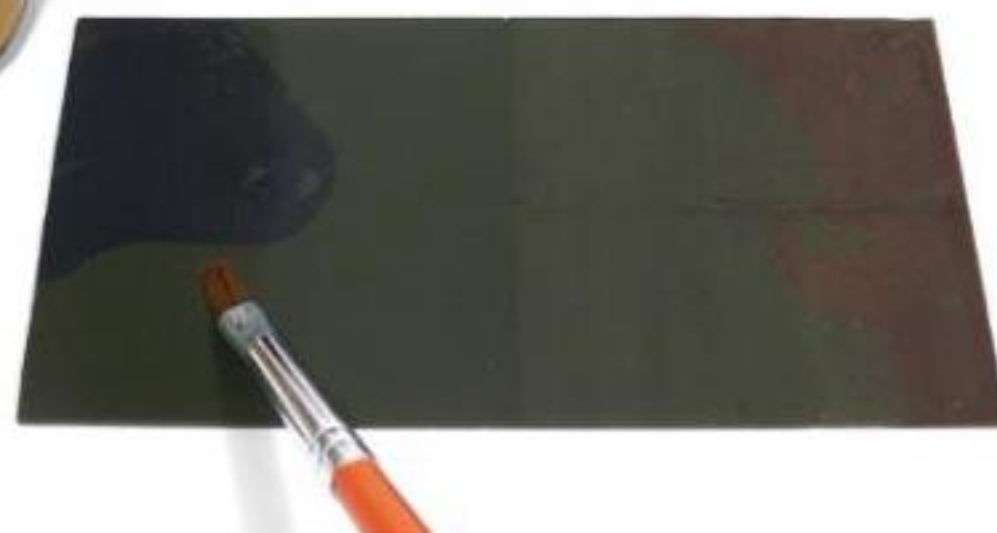
1 Lastly we will work on a typical tri-tonal NATO base. The combination of colours used are RC080 NATO Green, RC081 NATO Brown and RC082 NATO Black. The application can be found in chapter 7 dedicated to the chipping process. On the right half a Dark Brown AK076 filter is applied in the usual way.



2

Once dry, the camouflage colours are unified. Also with the use of browns the previous colours can be warmed up.

On the left side we apply a bluish filter AK071. 3



4

The result is more than evident since with the blue filter (left) the colours are cool, whilst with the brown filter (right) they become warm. In both cases its application harmonises and integrates the colours.

II. TECHNIQUES



CHAP.: 6

Washes

After the filters, we will look at applying washes, these are usually applied to add some depth and to define the details of our model.

Perhaps it is easier to choose a wash when it comes to understanding its purpose. The key point is to make sure we are choosing a suitable colour to add some contrast, but to make sure it complements the base colour it is being used on.

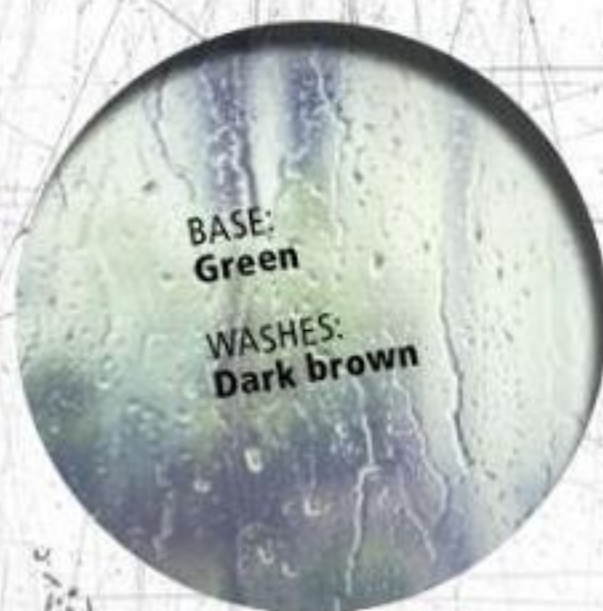
The same way we have applied the filters we are going to see the possibilities of washes over the four selected bases.

II.6.1. WASHES ON A SAND BASE

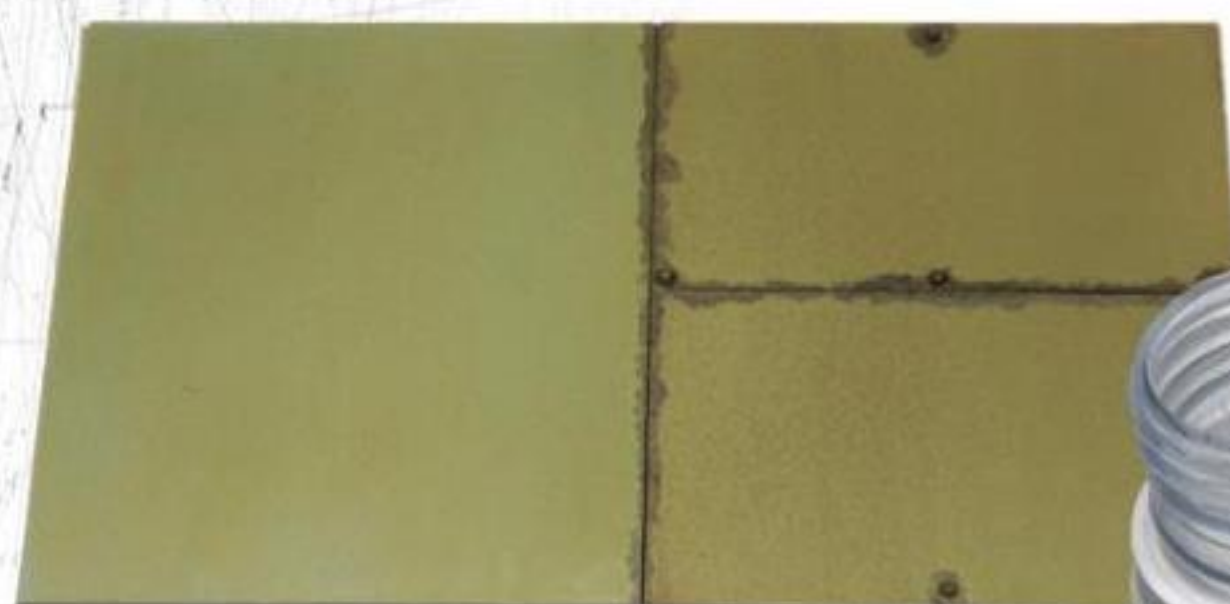


II.6.2.

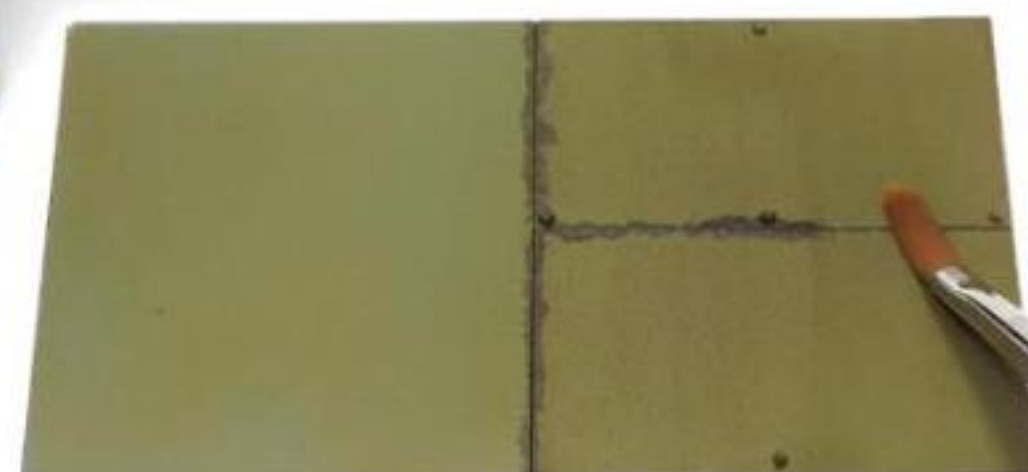
WASHES ON A GREEN BASE



- 1 In the case of a green surface we will opt for dark browns washes such as AK045 Dark Brown.



- 2 We will apply in a controlled way around crevices, rivets and in general around any detail.



- 3 After a few minutes it begins to dry and we can remove the excess with a brush moistened in White Spirit or similar.



- 4 Once we have finished the process, it's clear see the contrast and we can check that there are no stains. To avoid them It is best to moisten the surface completely before applying the wash.

II.6.3.

WASHES ON A DAGUET OR SIMILAR BASE



Any intermediate brown can be used, maybe more intense than in the first example, such as AK066 DAK.



We must be careful and work in small areas.

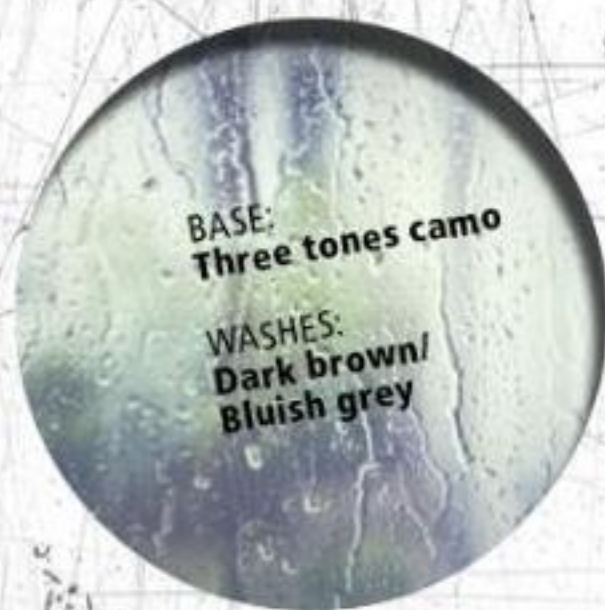


Once dry, we can carefully remove any excess, but making sure we don't remove too much, whilst keeping the surrounding areas clean.

The final result must be visible. The technique and its result can be seen compared to the rest of the panel.



II.6.4. WASHES ON A NATO BASE



1 For this colour combination, a dark wash will be required such as AK4161 allowing it to stand out against the three base colours.



2 After applying it along all the crevices and nooks and crannies, we'll wait a few minutes until it begins to dry.



3 We will remove the excess with a wide and flat brush moistened in clean White Spirit.



4 As observed the result must be clean, allowing us to appreciate the surface details



II. TECHNIQUES



CHAP.: 7

Wear&tear

The last part of the work on the base colour is the so called wear and tear, usually carried out with the oil paints.

They offer great potential and versatility, making them one of the best tools at our disposal for creating so many effects on our model, thanks to their ease of use and removal if you aren't happy with the result.

In the same way that we have done in the previous chapters, let's see the possibilities when applying the oil paints over our four different test pieces.

The only difference with respect to filters or washes is that in the case of oil paints we will use a palette since the best way of using them is in combination with others. This allows us to get the widest spectrum of possible colours and depth. In general, a selection of four oil paints will be more than enough. This palette will always depend on the base colour and all of the environmental conditions to which the vehicle has been exposed.

II.7.1.

WEAR&TEAR ON A SAND BASE



On a sand base the palette of oils can contain any of the mentioned tones. We have selected Abt.003 Dust, 092 Ocher, 010 Yellow and 160 Engine Grease.



2

On the left half the oils have been applied in the form of dots with a more or less random distribution.



3

Once applied, we blend the dots with a flat brush moistened in White Spirit or similar thinners.



4

The result is a surface with a multitude of shades thanks to the mixture of oils incorporated on the palette. We must be careful when blending these tones so they don't stand out as individual colours, but adding a subtle chromatic richness over the entire surface.



5

There is another way of applying this effect and that's dealing with individual areas, one at a time. Try to select the oil colour according to the area in which it is to be applied, working in phases. First we apply yellow and ochre



And the they blend.

6



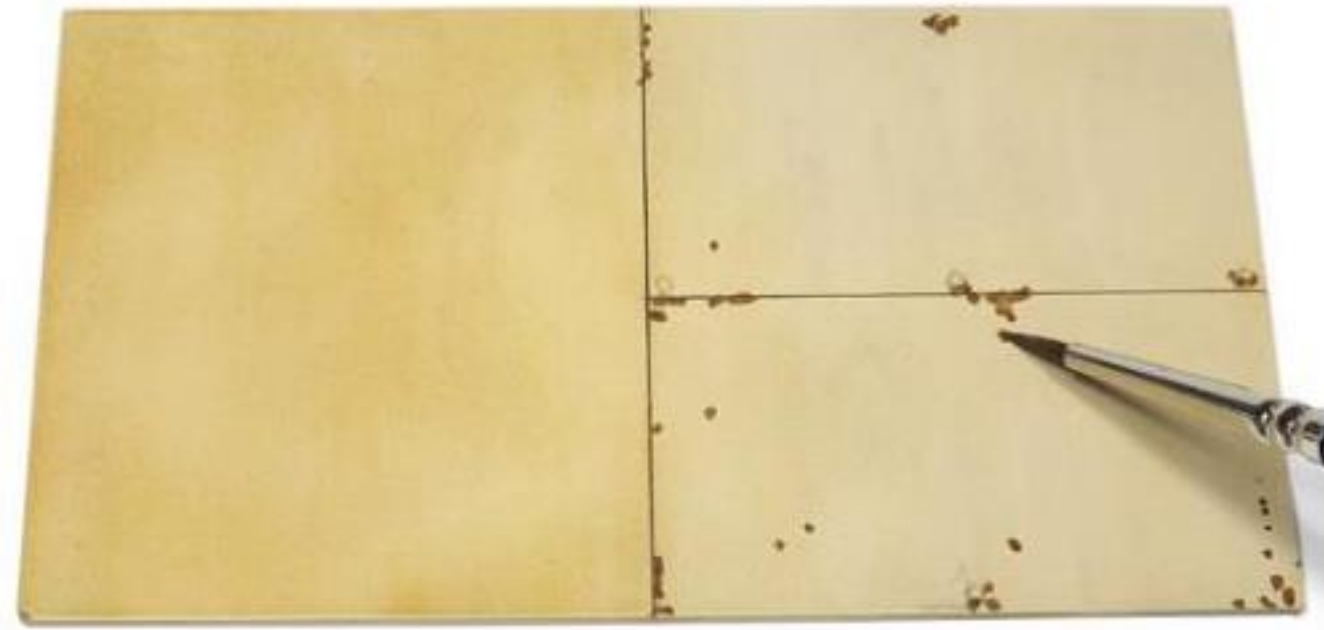
7

In a second phase the greyish sand tone (dust) is applied.



8

Now the the dust tone is blended in.



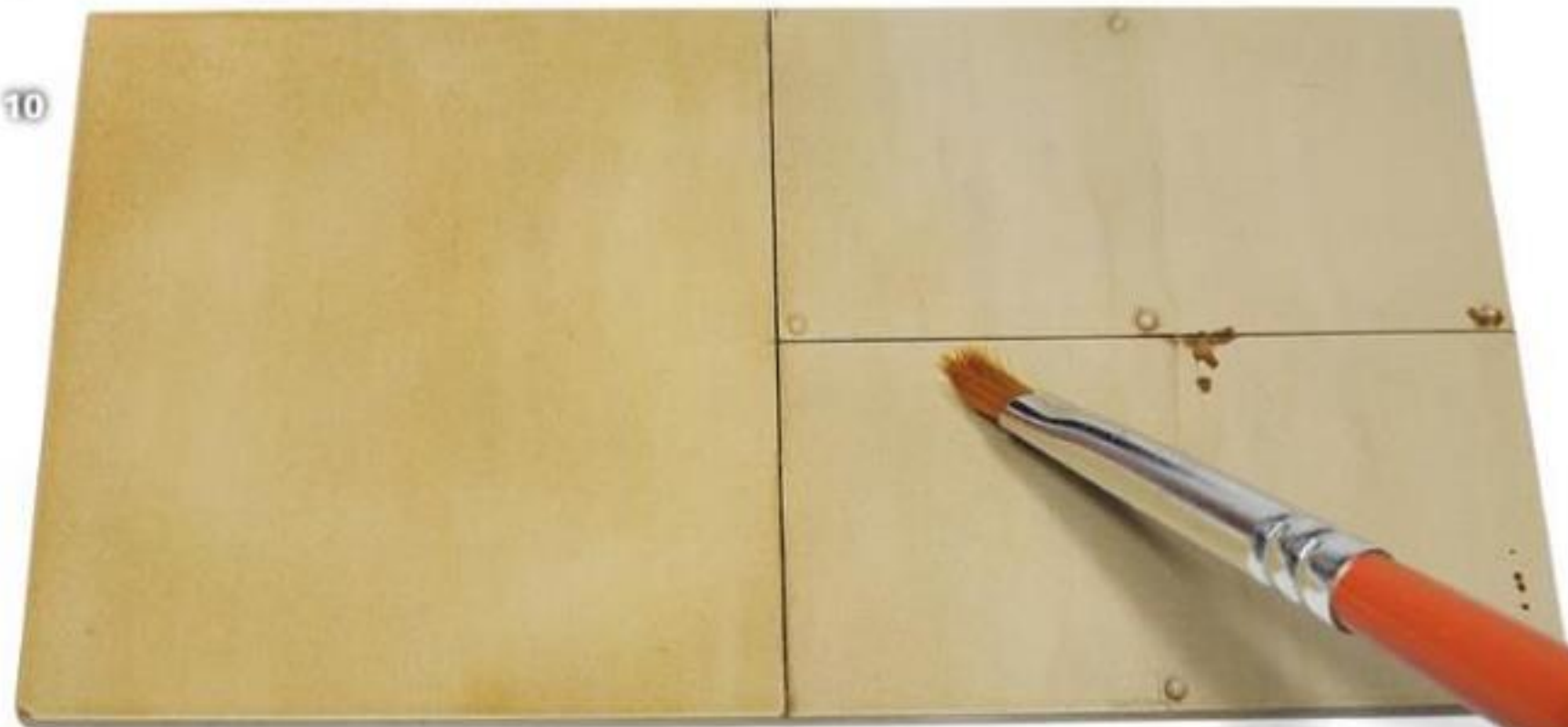
9

Finally, in a third phase, brown is applied.



We can now see how the basic effect has subtly altered the look of the original colour. At this point we can now stop, or if needed leave the oil paints to dry fully before applying any further tones.

10



The result on both parts is slightly different, but what is important is that we have obtained the appearance of worn paint

Regarding the way this effect is applied, by adding numerous multi-coloured dots, this technique is faster to apply but offers some monotony. On the other hand, the application of oils to one area at a time does take longer and will require a little more dexterity and overall vision but will guarantee a visibly more interesting and less uniform final effect.

11



II.7.2.

WEAR&TEAR ON A GREEN BASE

BASE:
Green

OILS:
Sand, ocher,
dark and
medium
brown

The working palette in this work includes Abt.003 Dust, 092 Ocher, 090 Industrial Earth and 005 Smoke.

First we deposit blobs of the oil paint onto a piece of paper or cardboard, this will help to absorb some oil. This helps to speed the drying time of the oil paint and allow it dry to a flat finish. The dots are best applied using a fine tipped brush.



3

As done previously, we blend the oils onto the surface with a flat brush moistened with White Spirit, cleaning the brush frequently to prevent the the individual colours mixing excessively.



4 After letting the oil paints dry, we can now see how tonal variations appear over the left half panel.



Then, on the right half, we proceed by applying the oils in a controlled and timely manner.

5



After applying a colour, blend it and repeat the process.

6





7
Time for ochre
on another
section of the
panel.



8
Although they are applied in different areas, there will always
be an intersection zone in which the different oil colours
interact with one another.



9
And then
blend it too.

In the end, the aim of this process is to simply recreate the effect of worn paint that has suffered from expose certain weathering conditions. The variety of shades and tones that are achieved and the effects they represent are almost limitless. Comparing the right and left panel, its amazing the difference by just adding and blending some oil paints.



10

II.7.3.

WEAR&TEAR ON A DAGUET OR SIMILAR BASE

BASE:
Two tones desert
camo

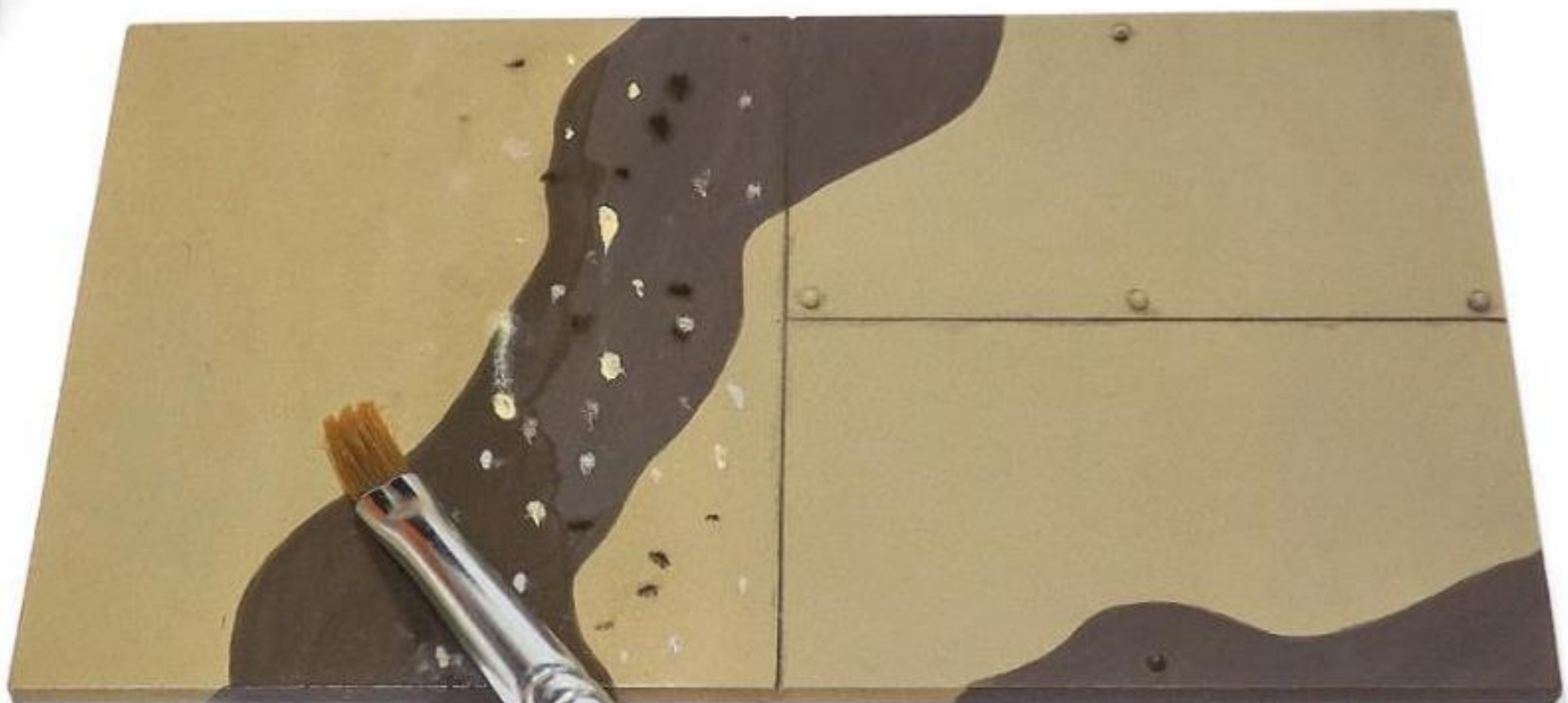
OILS:
Sand, grey,
ocher, flesh,
drak and medium
brown

On this panel we will include
Abt. 003 Dust, 145 Sunny
Flesh Tone, 125 Light Mud
and 090 Industrial Earth.



2

As on the previous examples, we randomly apply small dots to the left half section of the panel.



3

We gently blend the oils, removing the amount that we consider appropriate for the effect we want to create.

4



When observing the result, although subtle, it does allow us to appreciate changes and chromatic variations and the intensity of the base colour.

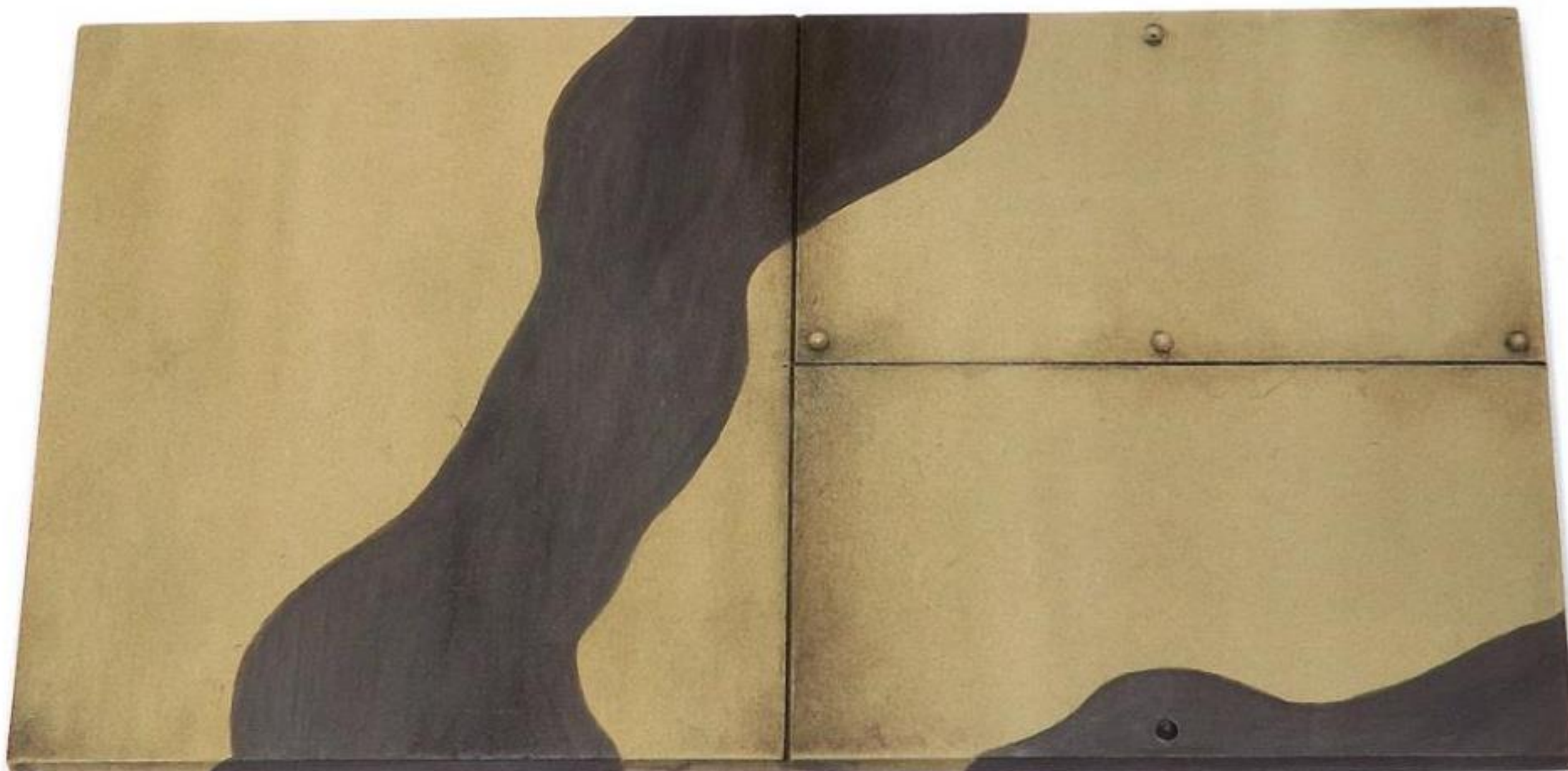
On the right half panel we now apply the dots, but this time we group them into zones of colour.

5



Comparing both halves the two styles of application are clearly evident, more aggressive on the right half, but the overall results regarding the chromatic variations achieved on the two-tone base are similar.

6



II.7.4.

WEAR&TEAR ON A NATO BASE



- 1 This palette contains Abt.003 Dust, 145 Sunny Skin Tone, 092 Ochre and 002 Sepia. It is about creating a balanced combination because this contains light, medium and dark tones.

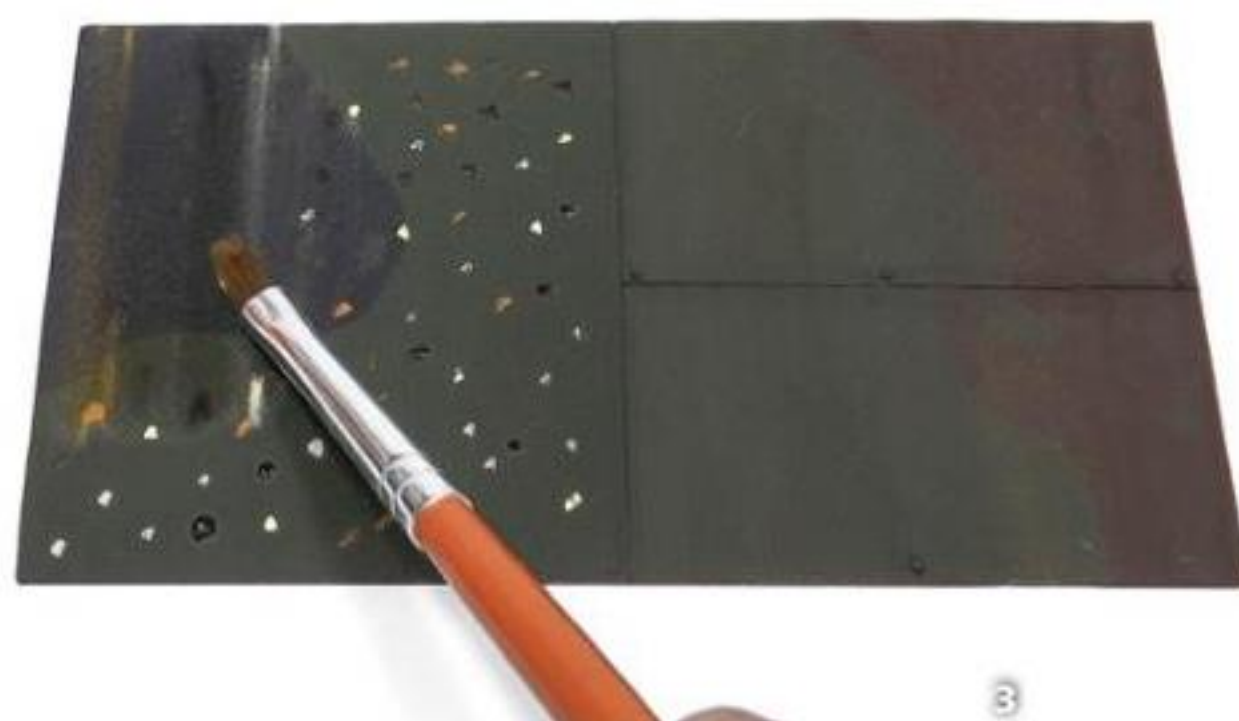


2

On the left side we apply the dots using the darker tones on the lower area of our test piece.

The results should be evident leaving the characteristic brush strokes.

4



3

We blend the oil dots by gently dragging the the brush down in vertical strokes, we can then sweep the surface with a larger brush, again moistened with White Spirit, to create a subtle effect.





5

On the right side we apply the oils in a more precise manner, selecting the one particular area and using one colour oil at a time.



6

As we did on the left side of the test panel, we sweep the surface with a moistened soft-brush until the oils are suitably blended.



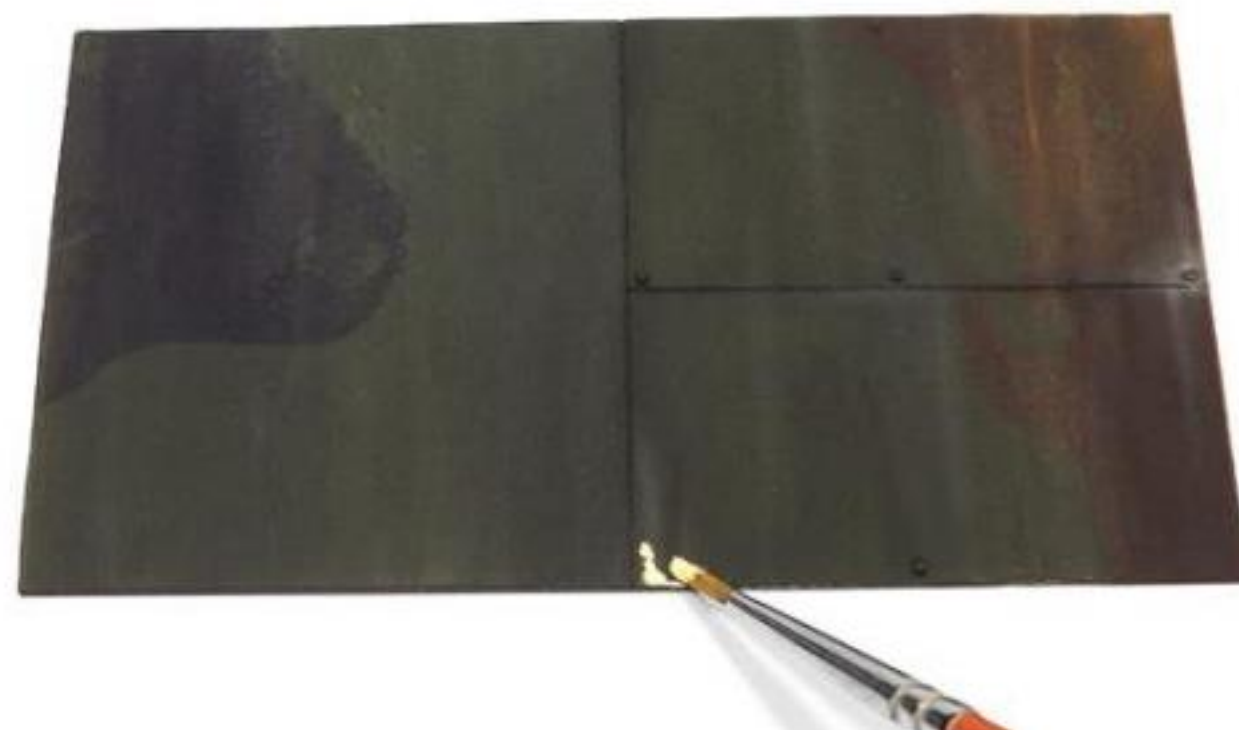
7

We then continue by adding the sepia colour along portions of the edge.



8

Our aim is to apply all four colours from our oil paint palette



The key to using this method is the placement of the oil colours. Although it is more time consuming, it's not difficult to apply and produces different results, as long as the colours aren't blended completely.

9



II. TECHNIQUES



CHAP.: 8

Chipping

Although it is a weathering step itself, the appearance of chipping on the base paint arises due the constant abrasion by external elements, such as vegetation and rough terrain, or the crew constantly climbing on and off the vehicle and even from bumps and dents.

There are several mediums and techniques we can use to produce chips, but for all of our examples we will be using acrylic based paints.

In this chapter we are going to see how to apply chipping effects on our four test bases and the importance of the colours that we choose to reproduce them

II.8.1.

CHIPPING ON A SAND BASE



One of the basic colours we can use to create chips, is one that has been especially formulated for just this task. AK711 Chipping Colour, which is a sort of dark brown tone with a reddish hue, perfect for creating the deepest scratches. In addition AK707 Medium Rust is perfect for a brighter rust tone, something that works very well on a light base colour.



2

We will start by applying the darker tone first, it's important to use a good quality fine-tipped brush and that the paint has been thinned with water.



3

The orange tones are applied. They are placed over the previous dark colour to represent the effect of oxidation on the area where the bare metal has become exposed to the elements.

The result will depend on the distribution, quantity and size, all critical factors when it comes to achieving the best results.

4





II.8.2.

CHIPPING ON A GREEN BASE



To represent chipping on a green base, we will use a green tone that is noticeably lighter than the base colour along with AK711 Dark Brown to give depth to the chips and scratches. On this example we're going to use the sponge method on the left side and on the right we will be using a brush

We will first take some of chosen light green acrylic and thin it with a little water. This is done to prevent it from drying out, rather than diluting it for painting. We dip the sponge into the paint using a pair of tweezers, before dabbing off the excess onto some absorbent paper. The secret to applying the paint is to tap the surface softly, little by little without too much pressure.

Although they are not overdone, we can still appreciate the results along the edges of the left hand panel. It must be said that this method does have a few flaws, as there is little control over the pattern of the chips and their shape. Repositioning the sponge in the tweezers will help. On the other hand it also has its advantages, being a quick and easy way, offering pretty credible results with little practice.

Next, and over the previous light green chips we will apply the dark brown ones, thus achieving an interesting depth effect.

With the sponge we can not only represent chips but also friction or scratches by lightly dragging the sponge in the required direction. This technique will require a bit of practice and is best achieved with very little paint on the sponge. This effect can be seen across the middle of the left panel.



6

We are now going to apply light green chips using a brush over the right side to compare the results achieved the sponge. It is best to use good quality brushes, Marta Kolinsky are the best in our opinion and diluting the paint will offer the finest results



7

Working with the brush is far more time-consuming, but allow for greater control on the size, shape and amount of individual chips and scratches we add.



8

Next, with the dark brown diluted with water we proceed in the same way, but by placing these chips inside the green ones, making sure we don't cover them completely. The end result should achieve a nice 3D effect.



If we observe both sides we check how the result varies depending on the method chosen. Often the best results are obtained by combining both techniques

9



II.8.3.

CHIPPING ON A BASE DAGUET OR SIMILAR



1

The chipping effect on a base with a desert camouflage is exactly the same as the previous example except for the colour for the chips. The idea is to first work with a flesh colour or very light sand in the areas more prone to damage



2

The more varied they are in shape and size, (small dots, scratches etc.) the more credible the final result will be.



On the right side we used a sponge to compare the effects with the ones on the left achieved with a brush.

3

First stage of light chipping finished. The number and intensity will depend on the operating conditions of the vehicle. Although it is not recommended to overdo the effect, a percentage of them will however disappear under further weathering effects.

4



In the second phase we add the deepest tone, once again making sure we stay within the edges of the lighter colour. Again we use AK711 Dark Brown to simulate the dark rust colour on the left hand panel with a brush.

5



... and on the right with the help of the sponge.

6



7

The final result depends on the actual camouflage it's applied to. As seen, the combination of both application methods enriches the final look, as we can see on the BTR.



II.8.4.

CHIPPING ON A NATO BASE



(1). Another way of adding chipping effects, is to use the fluids especially formulated for just this purpose, such as AK088 Worn Effects and AK089 Heavy Chipping. Both are applied in the same way, but they differ in the results produced. While the first fluid reproduces small chips, the second helps to simulate much larger and damage to the paint.

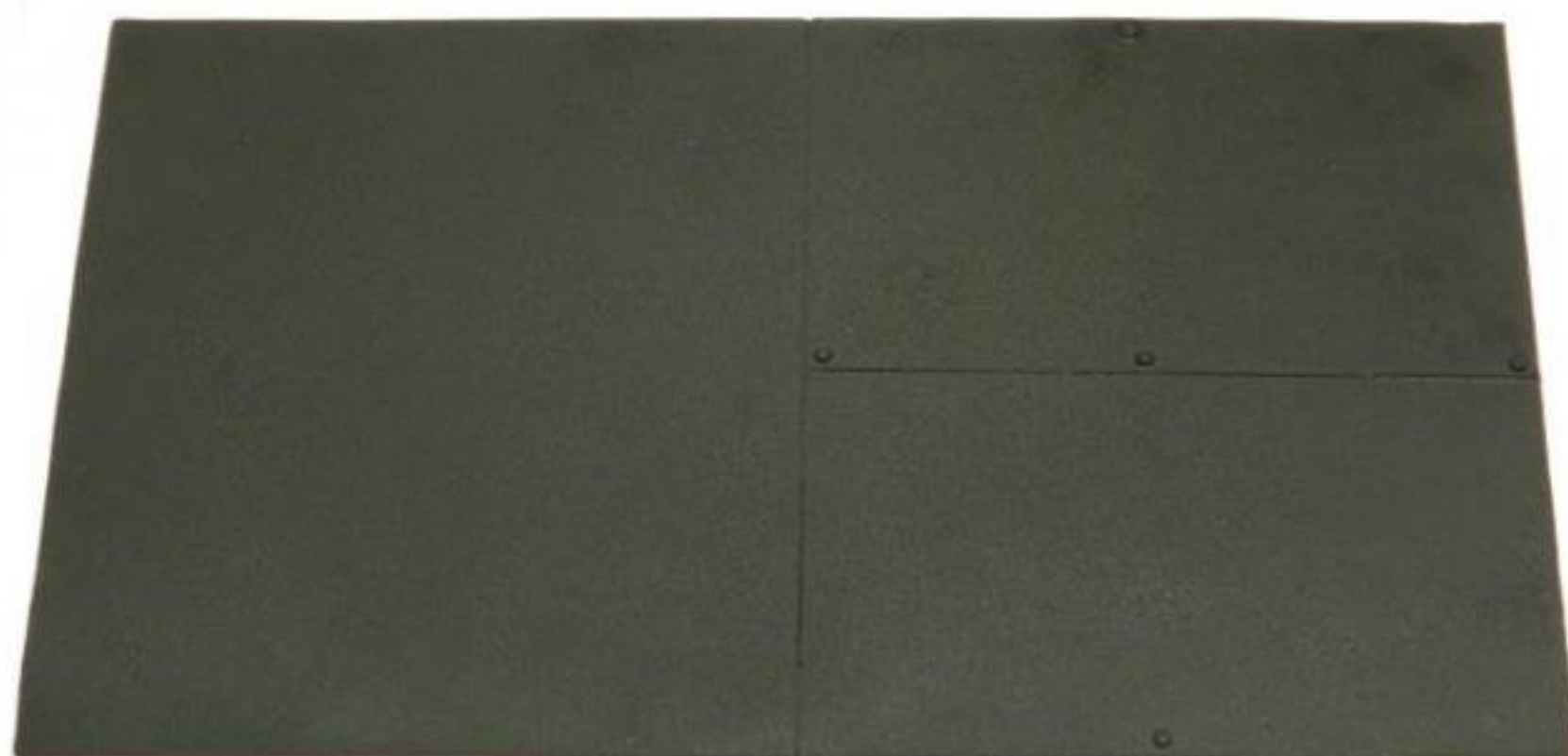
It is best Apply directly from the container using an airbrush. We can also mix them together to experiment and help to vary the results. The application method is always the same. First, a layer of paint is applied. Next airbrush the chipping liquid, and after allowing it to dry, apply the second colour on top. It is this second colour that we will be removing to reveal the colour underneath.

The drying time varies and although It is advisable to wait at least couple of hours, some modellers prefer wait only a few minutes before starting to apply the top colour. We are going to represent a NATO three-tone camouflage. After airbrushing RC080 NATO Green as a base colour, use AK089 Heavy Chipping to airbrush the entire surface.

(2). Wait for the Chipping fluid to dry completely before continuing with the next camouflage colour.

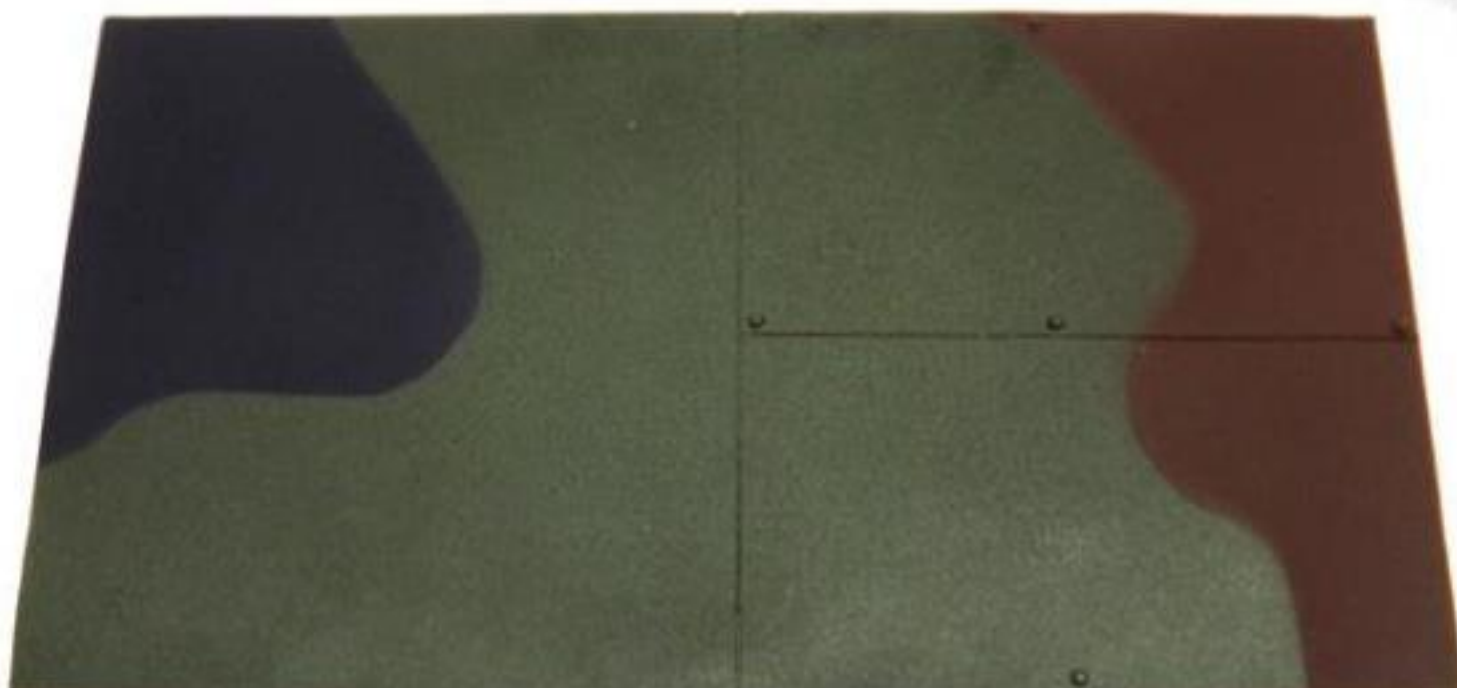
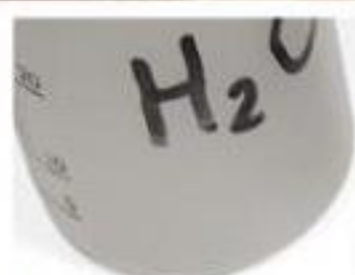
(3). Next we apply the second camouflage colour, RC081 NATO Brown. This can be done freehand or using masking tape, or fluid.

(4). The most important thing is to apply uniform layers of paint.





- 5 Next airbrush RC082 NATO Black to complete this well-known camouflage in use with many nations



6

Final look of the surface. RealColor paints will guarantee highly satisfactory results regarding the opacity, smoothness and range of colours.



7

To reproduce the chipping we just have to moisten the surface with water, this will start to activate the chipping fluid, observing how little by little the top layer of paint begins to lift showing the previous colour.

The size and shape of the chips will depend of the tools we use to reproduce them, using all kinds of brushes, including tooth brushes and tools such as toothpicks, needles, blades or even Scotchbrite-style cleaning pads.

Although for obvious reasons we have located this method within this chapter we do recommend you to read chapter 4 where we speak about how to apply the filters and the rest of the weathering techniques.

8



II. TECHNIQUES



CHAP.: 9

Rust effects

It may be a bit controversial to talk about rust on modern vehicles, as many modellers think in terms of latest generation of armoured vehicles being loaded with stowage and the only weathering being dust or mud. Even though it may seem like, but even modern vehicles made from steel will rust or corrode, if the bare armour is exposed to the elements. Studying reference photos of modern combat vehicles on operations or on exercise will reveal these effects, and not just on abandoned or wrecked vehicles.

The appearance of the rust over chipping and abrasions is caused by the effect of the weather and atmospheric conditions, but above all because due to the humidity of the environment.

To reproduce these with confidence there are several methods, which combine the use of oils and enamels. In this chapter we'll show you how to reproduce them by combining different tools and methods

II.9.1.

RUST ON A SAND BASE



Without wanting to recreate extreme oxidation we can use ABT.020 Faded Dark Yellow to add some subtle but pleasing effects on a light base colour



Usually, the use of oil paints is quite simple and allows us to rectify any mistakes easily if needed.

We can depict the characteristic streaking effect from some chipping depositing a minimum amount of oil and blending with a brush moistened in White Spirit or similar

2



These effects can be intensified adding more layers, achieving a frankly realistic appearance with a single colour

3

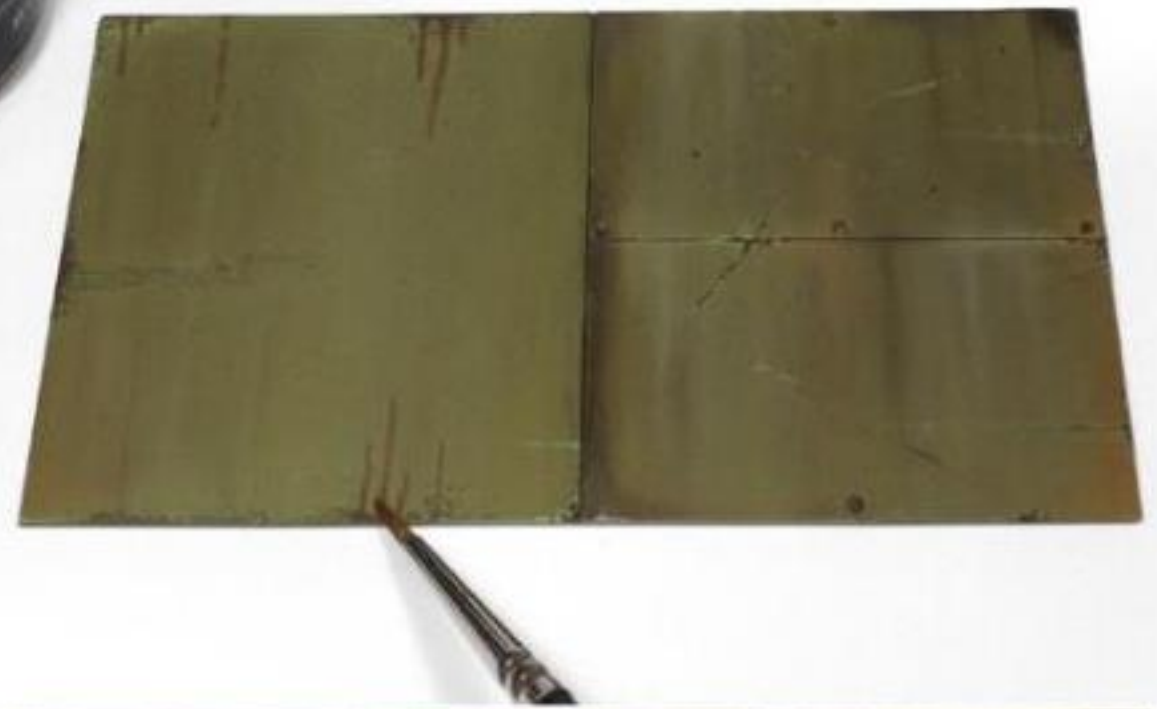


II.9.2.

RUST ON A GREEN BASE



1 Unlike oils, enamel has a matte finish and greater covering power. AK013 Rust Brown (with an orange hue) is perfect for depicting these effects. Apply with a fine brush and making sure we shake the bottle well before using it.



II.9.3.

RUST ON A DAGUET BASE OR SIMILAR



If in the first example we have used oils and in the second enamel glazes to depict the rust effects. Now we are going to combine both and check the results. We will use ABT.060 Light Rust and 070 Dark Rust oil paints.



2 Apply both tones straight on the areas previously selected using the tip of a brush



Blend the colours with the brush moistened in White Spirit, trying to sweep the surface and leave orange and brown brush strokes.



The result, on the left side is a red/orange patina.



(5). We are going to apply streaking lines and dots to the right side using AK013 Rust Streaks straight from the bottle.

(6). Next we apply AK046 in a more controlled way and in a smaller quantity

(7). Finally blend and unify with the help of Thinner for Enamels.

(8). The final look is the combination of both methods helping to depict a rusty patina completely integrated with the base colours



II.9.4. RUST ON A NATO BASE

Although as we have said talk about rust effects may sound extreme in certain type of modern vehicles, let's see how to get them using a combination of enamels and oils as can be useful sometimes



Deposit a small amount of AK013 Rust Streaks into a small container.



Next add a similar amount of Abt.080 Brown Wash oil paint.



Paint streaks with the mix onto the chosen areas.

With a brush moistened in White Spirit or Odourless thinner we gently drag the mix trying to blend it.

The result must be evident but diffused. It is important to keep the streaks vertical and parallel.





7

We will reinforce the previous effect with Abt.060 Light Rust and 070 Dark Rust oils



8

We start with the darkest oil, applying it directly from the tube on top of the previous streaks.



9

Then we blend again with a brush and thinners from top to bottom .



10

Apply the light oil tone in the same way as the previous one, especially in the areas where we want to reproduce a more extreme effect.

The effect and transparency obtained through the application of various oils and enamel can be more or less intense depending on the layers applied. Matt finishes are obtained with the enamels while with the oils we usually get satin effects. These types of variations add interest to the final result.

11



II. TECHNIQUES



CHAP.: 10

Dust and mud

We are now reaching the final steps. We can no longer talk about altering or modifying the base colour, nor about wear and tear, but we are now going to focus fully on the weathering process.

Although everything seen until now contributes to enhance the overall look of the vehicle, it's in this chapter and the next, where we demonstrate about how to add the final look that we have in mind from the beginning to integrating the vehicle into its environment.

We will use different mediums, such as enamels, pigments and specialist products to imitate textures, which we will apply both by brush and airbrush.



II.10.1.

DUST ON A SAND BASE



A medium or dark layer of dust over this light base is easy to do using dry pigments such as ABT.028 Europe Dust and 033 Dark Mud.



2 Although the application of pigments might seem quite simple, just deposit them with a brush onto the model. It is in fact, not that easy and the results can often turn out not the way we expected, due to the way we have to fix them permanently to the surface of the model. First we apply the dark pigment on the lower area of the panel.



3 Next we apply the intermediate colour within the central area, in combination with the previous tone, we can create a natural and uneven look.



4 Finally, rubbing with a soft brush will remove the excess pigment and help to fix some of it to the matte surface. Although the pigment will not be fixed properly, the result will however be a light layer of dust that will be visible due to the subtle change in colour. Pigments applied this way defuse the contrast and depth achieved in previous phases but provide some integration of the vehicle into certain environmental conditions.

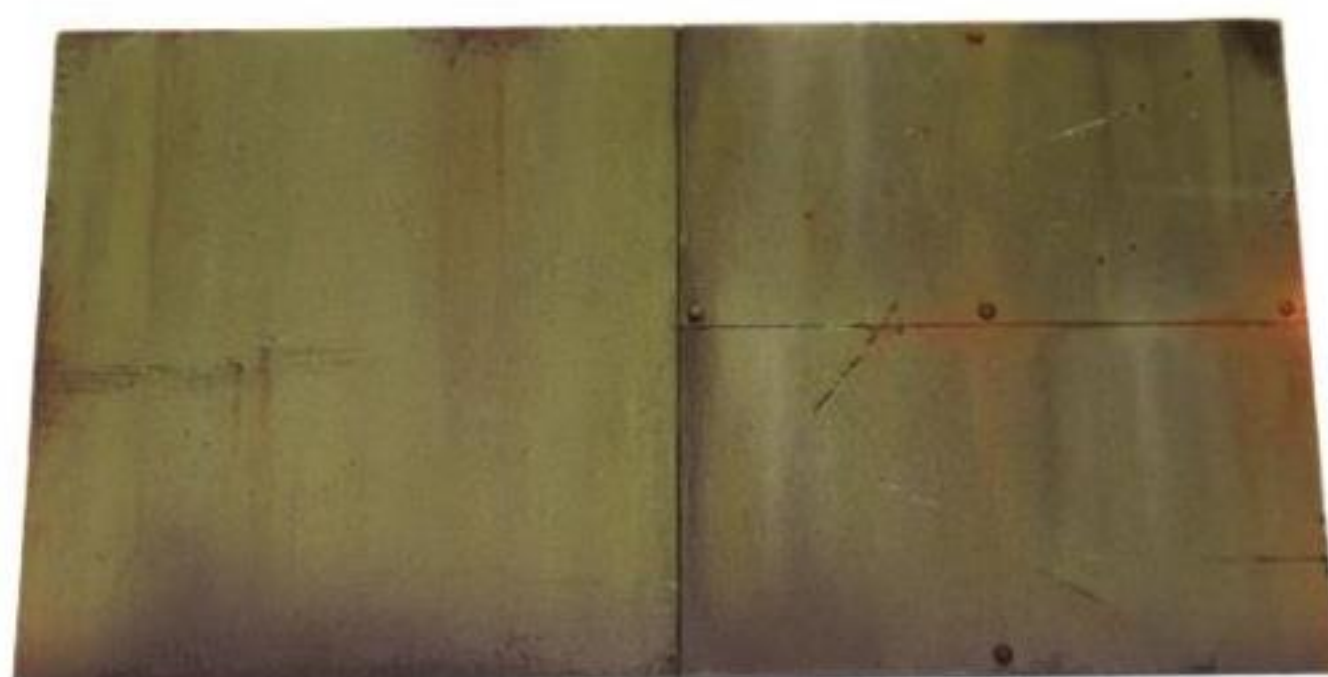
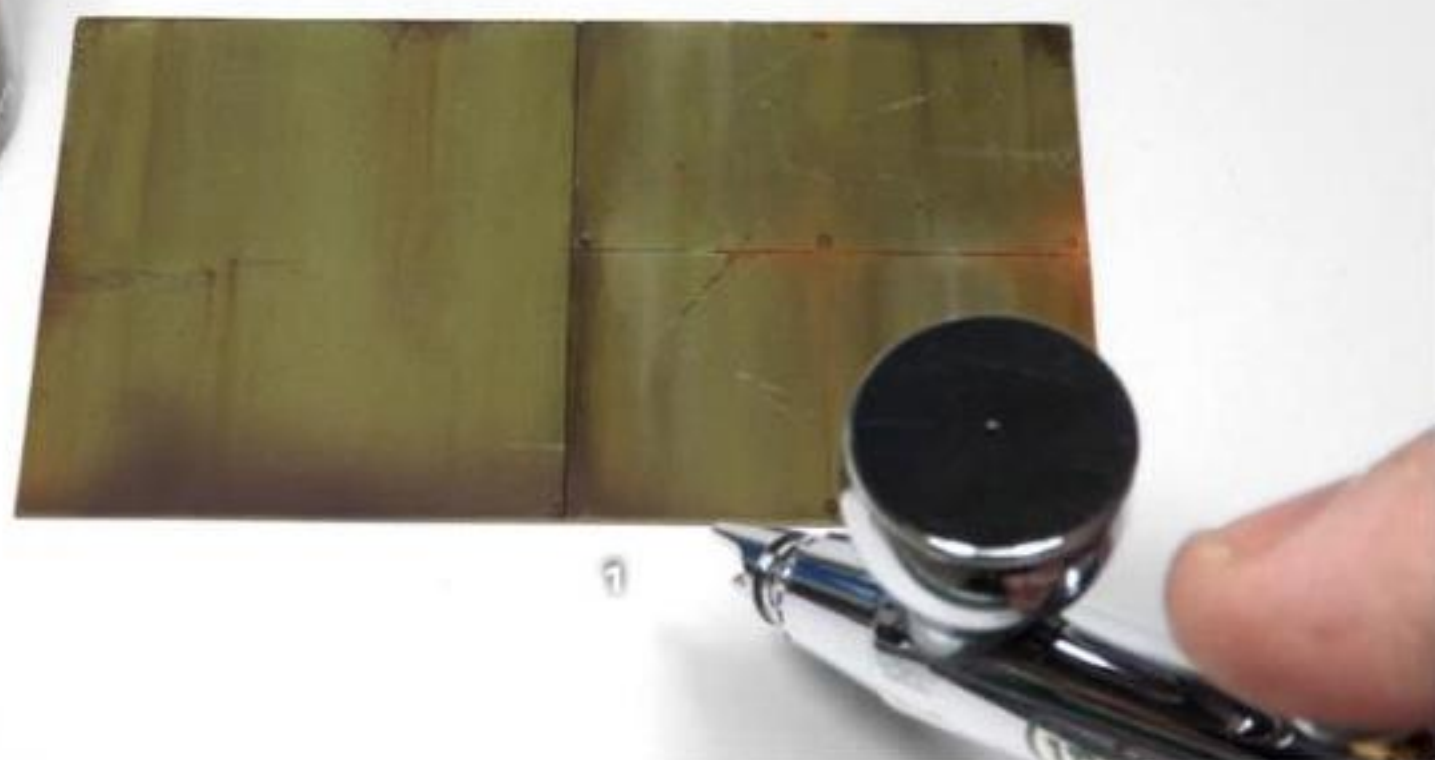
II.10.2.

MUD ON A GREEN BASE

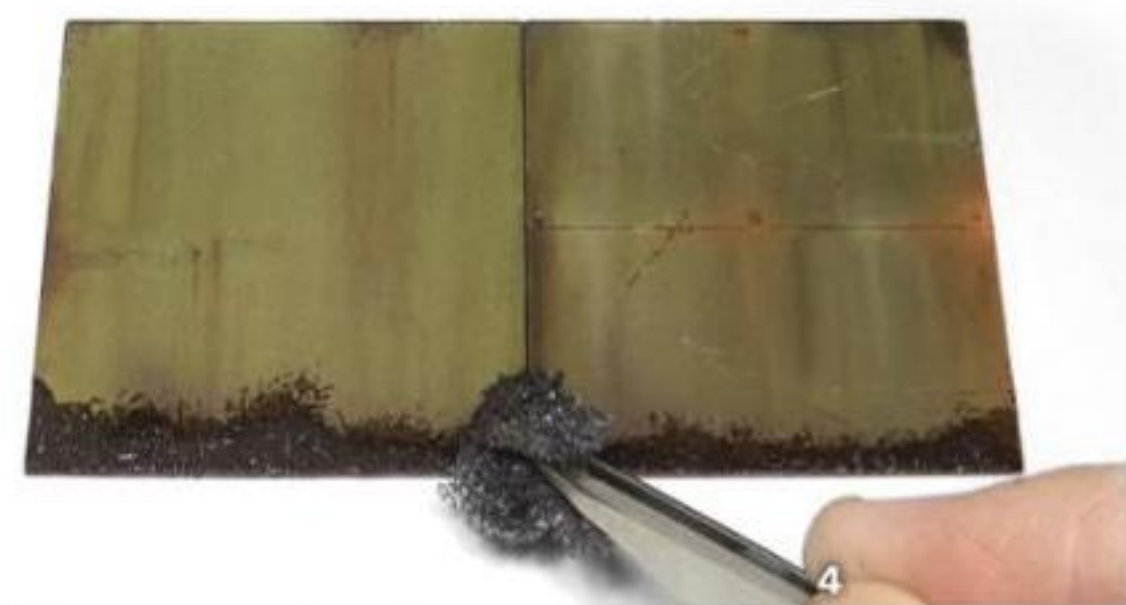


(1). If we want to add a layer of mud? Then a product that provides texture is what will be needed. In this example we will use one of the products from the new series for dioramas, whose properties will allow us to obtain the necessary finish to realistically depict the mud on a vehicle. In addition we will combine these with enamels for earth effects. First we airbrush a layer of dark brown onto our chosen area using RC074

The extension of the airbrushed area will depend on the desired result. This matte layer is ideal to prime the area for further treatments.



There are many products designed to create textures on dioramas and vignettes that can also be used to integrate the vehicles into the groundwork. We are going to apply AK8026 Wet Mud, with a satin finish using a brush



After waiting for the product to set for a bit, we will apply more texture by dabbing with a piece of sponge. This is will help to create a gritty and rough texture as the Wet Mud sets.

Let it dry for a few minutes.



With the same product we will apply small and random splashes by flicking it from a paintbrush using a cocktail stick.



Now the look and texture is exactly what we are after, but it's still too monotone.



A different tone of the Wed mud is mixed by adding some pigment. This is then 'flicked on' to simulate mud that has started to dry.



Observing the final finish we can see how the combination of the products provide the texture needed to simulate extreme conditions on the lower hull of our test panel.



II.10.3.

DEPOSITS ON A DAGUET OR SIMILAR BASE

BASE:
Two tones desert
camo

DEPOSITS:
Dust enamels
and medium
brown
pigments

To represent accumulated dust and dried-mud with less texture than in the previous example we are going to use a mixture of enamels and pigments. We will begin by airbrushing a Middle earth tone such as RC075 onto our chosen area

1



2

This type of intermediate tone is perfect for this type of camouflage pattern. The pre- dust effect must be subtle, like a filter, covering only the lower areas of the vehicle



3

We can now add the texture using enamel based effects such as AK4062 Light Dust Deposit. Splash the product over the surface



4

Repeating the process will build-up the effect to improve the result.



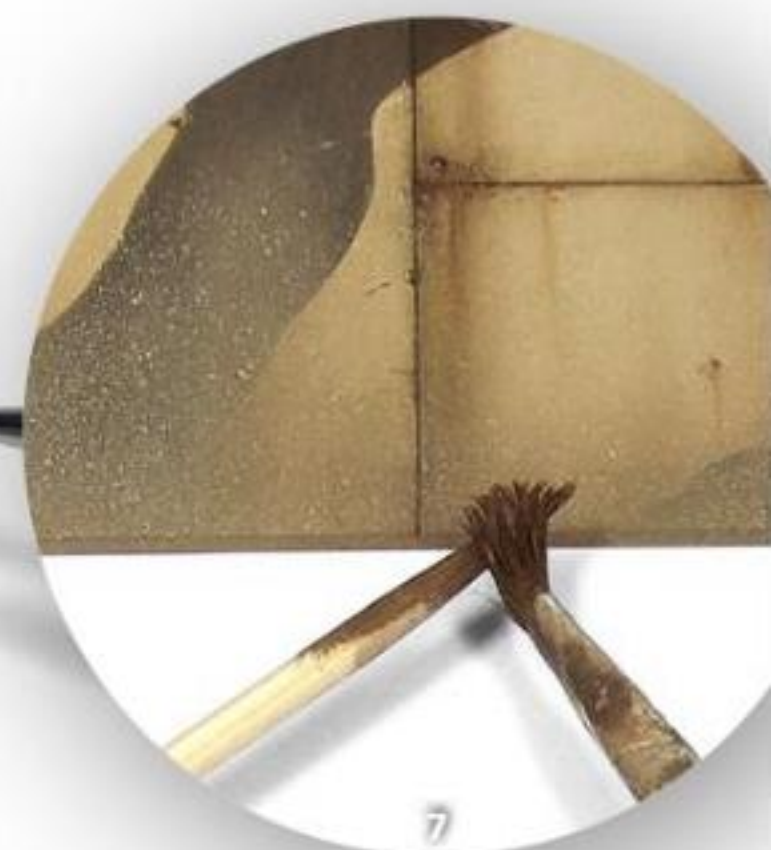
5

The last step will be the combination of enamel with the pigment to increase the texture and chromatic richness of the surface



6

Combine enamel AK4063 Brown Earth Deposit with P028 Europe Dust pigment.



7

We will apply the mixture by splashing onto the lower area without covering the previous effect.



8 The final result is a combination of textures and colours suitable for camouflage with great depth and chromatic richness.

II.10.4.

LIGHT DUST ON A NATO BASE



To achieve a light layer of dust with accumulated earth it is advisable to airbrush an initial layer of paint, such as RC014 Buff though you can use any light sandy colour.

1



2

We aim to focus this layer on the lower areas of the model, defining the area for further work



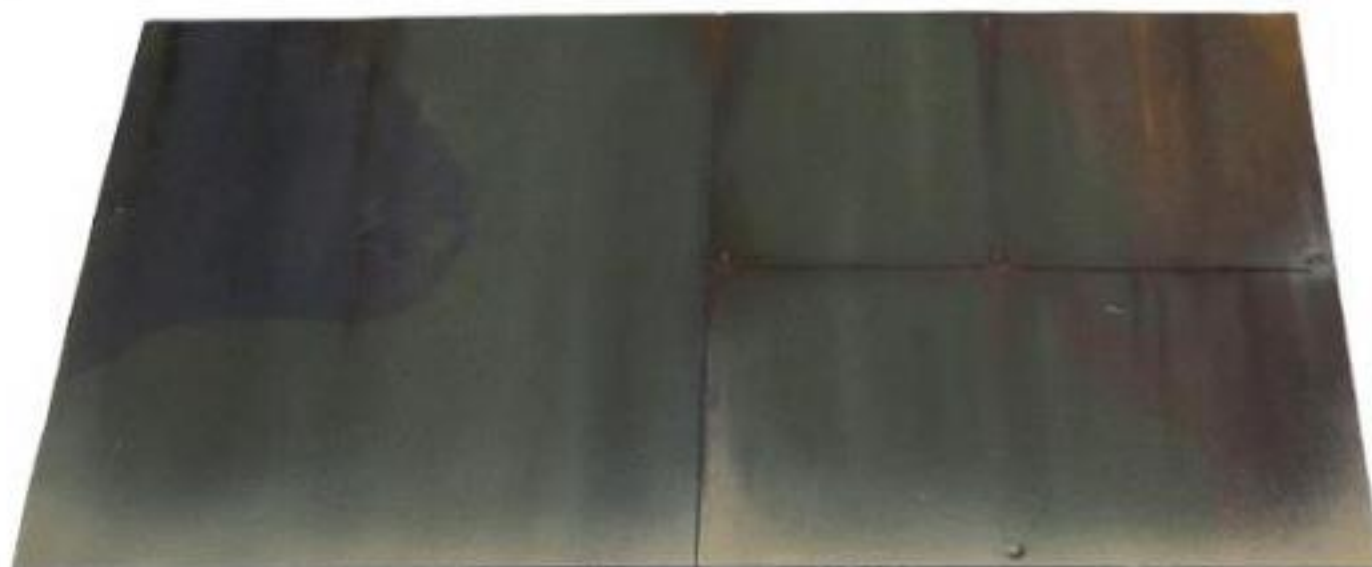
3

We will use a combination of pigment and enamel based effects applied through splashes to add more depth and texture.



4

Deposit a small amount of Abt.054 Alcaline Dust pigment into a container.

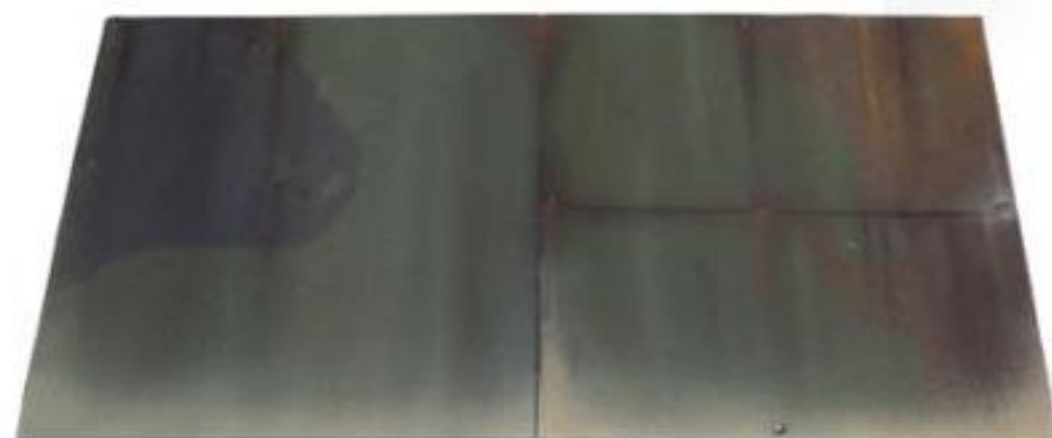




- 5 Then add a small quantity of AK4061 Yellow Sand Deposit.



- 6 Depending on the amount of pigment added will determine how thick this mix becomes.



Our choice of brush type we will offer different results. It is important to practice this effect first, to be able check how it should turn out. We can use a stick or finger to splash the mix, whilst covering the surface with a piece of paper to protect it from unwanted splashes.

7



- 8 We can get different finishes and intensities building up more layers and varying the density of the mix until you get the desired results.

II. TECHNIQUES



CHAP.: 11

Wet effects

The last part of this finishing phase deals with the so-called 'wet effects' produced by any type of fluid, either from the vehicle itself or from outside influences, creating all kinds of spots, stains, splatters and splashes.

These spots are due to leaks of gasoline, oil, hydraulic fluids, or just about any substance that can spill onto the vehicle's surface. These final details makes a difference so we must pay special attention to them.

All these effects can be reproduced, by using a range of different mediums, such as enamels and oils, in combination with satin and gloss varnishes that will all help to achieve an eye-catching finish.

II.II.I.

WET EFFECTS ON A SAND BASE



Among the many ready to use products available to today's modeller, we have AK025 Fuel Stains, which we apply straight from the bottle on to appropriate areas.

Without waiting for it to dry and with the same brush moistened in White Spirit we can completely blend the edges to depict a fuel spill.

After its application, to intensify the effect we must let it dry completely and then apply a second coat. The accumulation of different layers (drops, stains, streaks, etc.) will create variety and make the result more convincing.



II.11.2.

WET EFFECTS ON A GREEN BASE



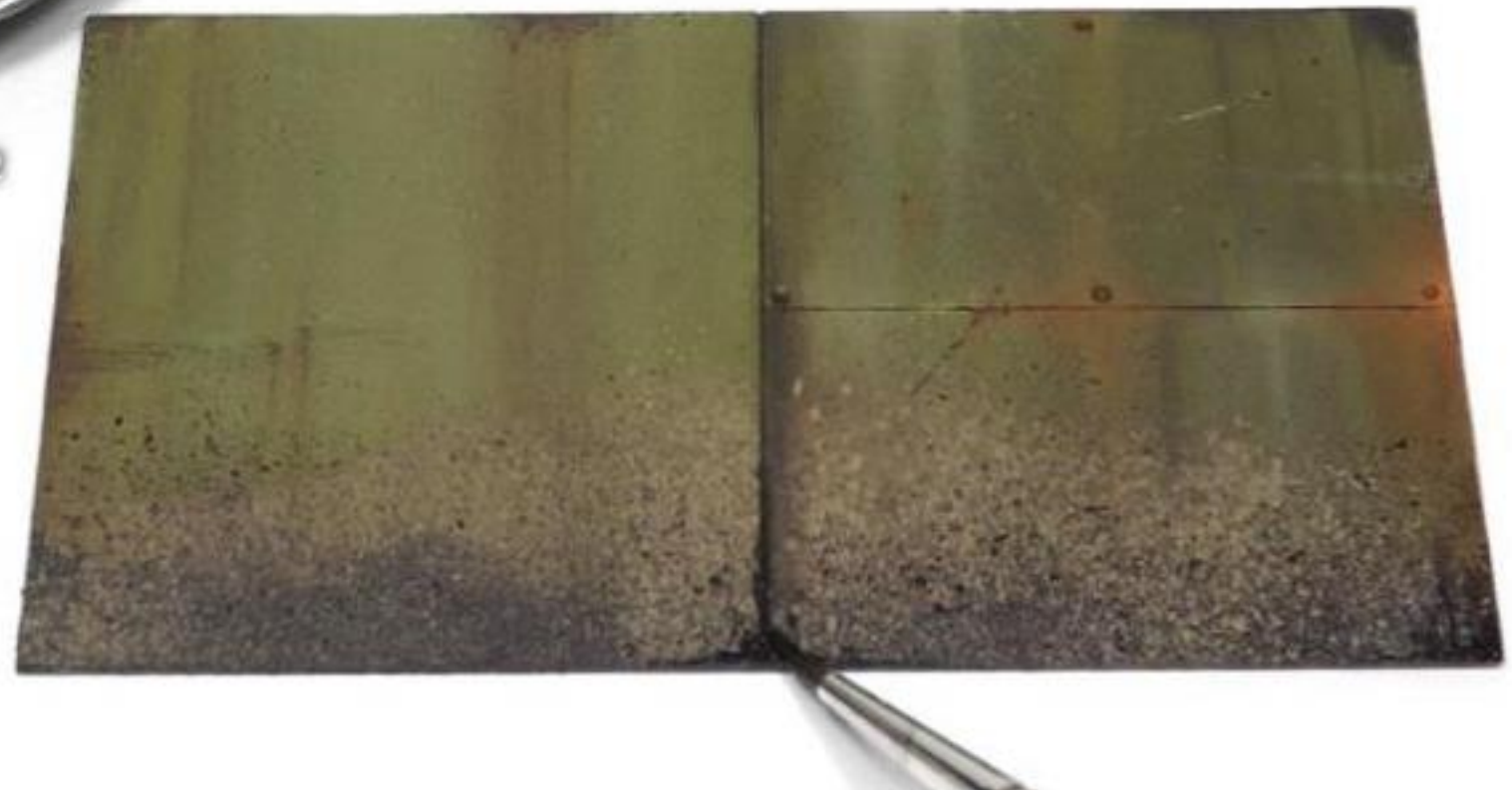
To add a wet look to a muddy surface with a lot of texture we can use a mix of Abt.110 Black oil and AK079 Wet Effects Fluid or a glaze with enamel based varnish.

1



After mixing them well, we will apply this mix over the area's most prone to accumulating moisture, such as the lower hull or any recess. Once the stain is applied we can blend it and soften the edges with a brush moistened in White Spirit. We can also apply smaller spots and splashing with the help of a toothpick.

2



The fact of adding oil, dark brown or black, to the satin or gloss varnish will provide depth and will improve the final result. By reapplying only the varnish, we can replicate the wettest areas. This will also create contrast between dry and wet mud, improving the overall visual appearance.

3



II.11.3.

WET EFFECTS ON A DAGUET OR SIMILAR BASE



We are going to represent some spots of grease and oil over this type of camouflage. Splash AK2029 enamel to simulate hydraulic oil leaks.



(2). Even though the finish of this type of enamels is satin or gloss, when applied on surfaces with a high accumulation of pigments tends to absorb the brightness so usually the first layers of enamels will just act as a base for the following layers.

(3). Now we are going to combine AK084 Engine Oil mixed with ABT.160 Engine Grease oil to represent oil leaks with a high percentage of oil obtaining a very interesting result.

(4). We mix them in a well slightly splashing this tone over the previous accumulated area trying not to puddle it too much.

(5). We will work in the same way as in the previous example with the wet effects, little-by-little and layers-by-layer. After each layer, we will check the result, deciding whether to continue building-up this effect.

(6) If we use a brush that is too loaded with paint, it can cause us problems. This is why experimenting, can help us better control the effects and offer a more varied finish.



The application of this combination of effects over this type of camouflages is highly recommended.



II.11.4.

WET EFFECTS ON A NATO BASE



To provide some variety and attractiveness we can add some spots and wet effects using AK079 Wet Effects.



1



2 To avoid unwanted spots we will protect some areas with tissue while we splash the Wet Effects diluted with White Spirit.

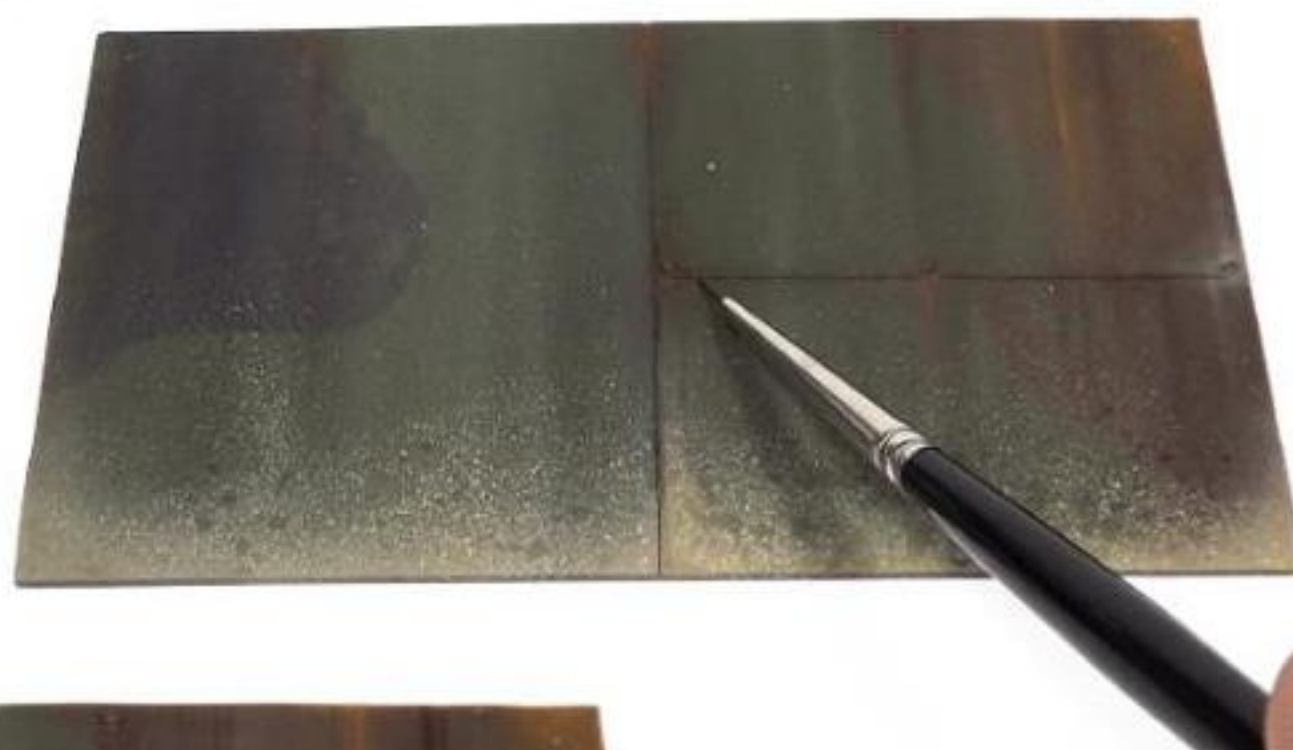
After this first application we get a random effect with interesting contrasts.

3



We can add some spots and streaks with a fine brush to complete the previous work.

4



5 Fine splashes and small streaks with a brush contribute to a more interesting touch to break the monotony of the light dusty layer.



II. TECHNIQUES



CHAP.: 12



Accessories

At this point many of us could consider that our project is now finished, when we see it on the workbench as brand new model ready to be displayed in our showcase.

Well, at first sight this may seem true, but it is only at first sight. In fact, if our model is completely painted and weathered, why do we say that it is not finished? What is missing?

The answer to these questions are the items that bring it to life. The accessories, stowage, figures and all that series of elements that aren't actually part of the model.

It is precisely these details the ones that makes the difference and these that will add life to our model, whether or not it stands alone, or in a vignette or part of a diorama. In many cases they can require as much time and dedication as the actual model. This is so important, as poorly painted accessories or figures can completely spoil the whole model.

Try it and continue reading!!

II.12.1.

STOWAGE AND FIGURES

Among the basic accessories that we can include on our model we can place in two large groups, the stowage used by the crew and the actual figures themselves, whether they are crew or not.

Regarding the figures, when it comes to the crew, there is no problem since each member has a predetermined place, be it a seat or hatch to man.

It is not the same with the figures that are not part of the crew and we want to place on our model, or with the stowage and accessories as they require study and may need test fitting many times before we find their perfect location.

In this chapter we will not go into detail regarding painting of all these elements, but we will try to see which to choose and how to place them once finished.



Choices

(1). The choice of accessories or the loading of a vehicle can be a big headache. Place a few simple fuel drums on the cargo bed of a truck and it will change its look radically

(2). The possibilities are endless and many times we will find simple accessories that will allow us to experiment with the paint to achieve a really surprising finish. These drums have been decorated with decals from civilian vehicles and have been saturated with oily grease, until we get a realistic look. The wood pallet with traces of other drums fits perfectly on a truck or a modern themed diorama.

(3). When it comes to painting of these accessories, acrylics, enamels and oils are all being used. The decals come from the famous box of leftovers that as modellers, we all save for future projects.

(4). Any load is good and the more suggestive, the better. These simple traffic cones will be suitable for any model and situation.

(5). Finally, once all the accessories have been painted, it is convenient to start with the fitting. It is not an easy task. We have to start by placing them without glue. Once we find the final location, we should take one or several photos to remember the position as we glue them into place.



Load on trucks and light vehicles



(1). Placing the load on to the cargo bed of a truck is relatively easy and just requires some common sense. It's advisable to use white glue to fix the different elements.

(2). Once located we will clean the excess with water to avoid remnants of white glue.

(3). The white glue is excellent for its flexibility and is virtually invisible once dry and also holds any material perfectly in place.

(4). Some elements can be manipulated with tweezers. If it is necessary to use fingers, it is advisable to wear gloves so as not to leave fingerprints.

(5,6). Once all the accessories are placed and the load is completed, we'll wait for the glue to dry and then we can start with the fasteners.





8

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(8,9) It is important to try to restrain the load for obvious reasons. On this occasion the straps and fasteners have been made with brass sheet, adding the hooks and clasps with a commercial photo-etch set.

(10) In this case the load consists of a pair of accessories, a fuel drum and a can, although what's really interesting are the piece of artillery and the empty ammunition cases scattered around the bed.



11 12



13



14



15

(11,12). This combination is often seen in conflicts both in the Middle East and in Eastern Europe, such as the Balkans. The improvised fasteners based on metal frames in the base of the bed and chains prevent the piece moving too much, but without too much security.

(13). But if there are specialists in equipping their vehicles, then it is the Israeli Defence Force, being experts in adapting vehicles perfectly to their own requirements. Take this Ford Mutt becomes authentic all terrain Anti-Tank killer. In the frontal area we can find boxes, ropes, cans, tarpaulins and even a stretcher carrier on the hood.

(14). In the rear area we can find ammunition boxes, the radio equipment and some fuel cans and also there's a small seat for a crew member and the TOW missile launcher.

(15). Lastly, in the central area and right side of the vehicle we found TOW missiles, the folded stretcher, the spare wheel, some tools and fire extinguisher. All in all, an authentic challenge in terms of space and size.

Stowage on armoured vehicles

(1). Even though the configuration and geometry of some armoured vehicles do not allow exaggeration with the stowage, the ingenuity of their crews, still manage to find somewhere to fit all the essential items needed in combat . Again we are looking at an armoured IDF vehicle, although in this case not covered in personal equipment, as most would be carried internally. On the back we do still have a few cans, a bundle of canvas and space for another spare wheel.

(2). On the roof only a few boxes of ammunition and spare wheels. The spare tracks and some suspension components as well as fire extinguishers are also common on the front of the M113. Also on the left side we can see multiple boxes and tool containers, welding bottles and more cans in the front side.

(3). In this example we can see how the equipment and the accesories inevitably catches our attention.

(4). Again on an M113, this time from the Vietnam conflict we can observe practically everything and all well packed. In fact, if we refer to the visual references and photos of the time, the upper part were used by the troops and their gear, turning these armoured vehicles into authentic transport caravans. On the rear there are some ration boxes, fuel cans and even some rubber hoses

(5). On the back top we can find ammo boxes, some protection sandbags, backpacks, icebox, thermos, magazines and of course, a stereo radio. As well as a palm leaf which has been included to add a sense of its operating environment.



Stowage on vehicles



As we see in many photos, you can change the location but not the customs. On these armoured vehicles located on different battle fronts, you'll find boxes of all shapes and sizes, mats, bags and tarpaulins and even some wooden trunks fastened with straps and spare-tracks that provide a splash of colour. On the sides we can find some tyres used as some form of stand-off armour. On the rear deck of one of them sits a refrigerator! Simple but effective. Anything that goes out of the ordinary helps and also adds an original and personal touch to our model.

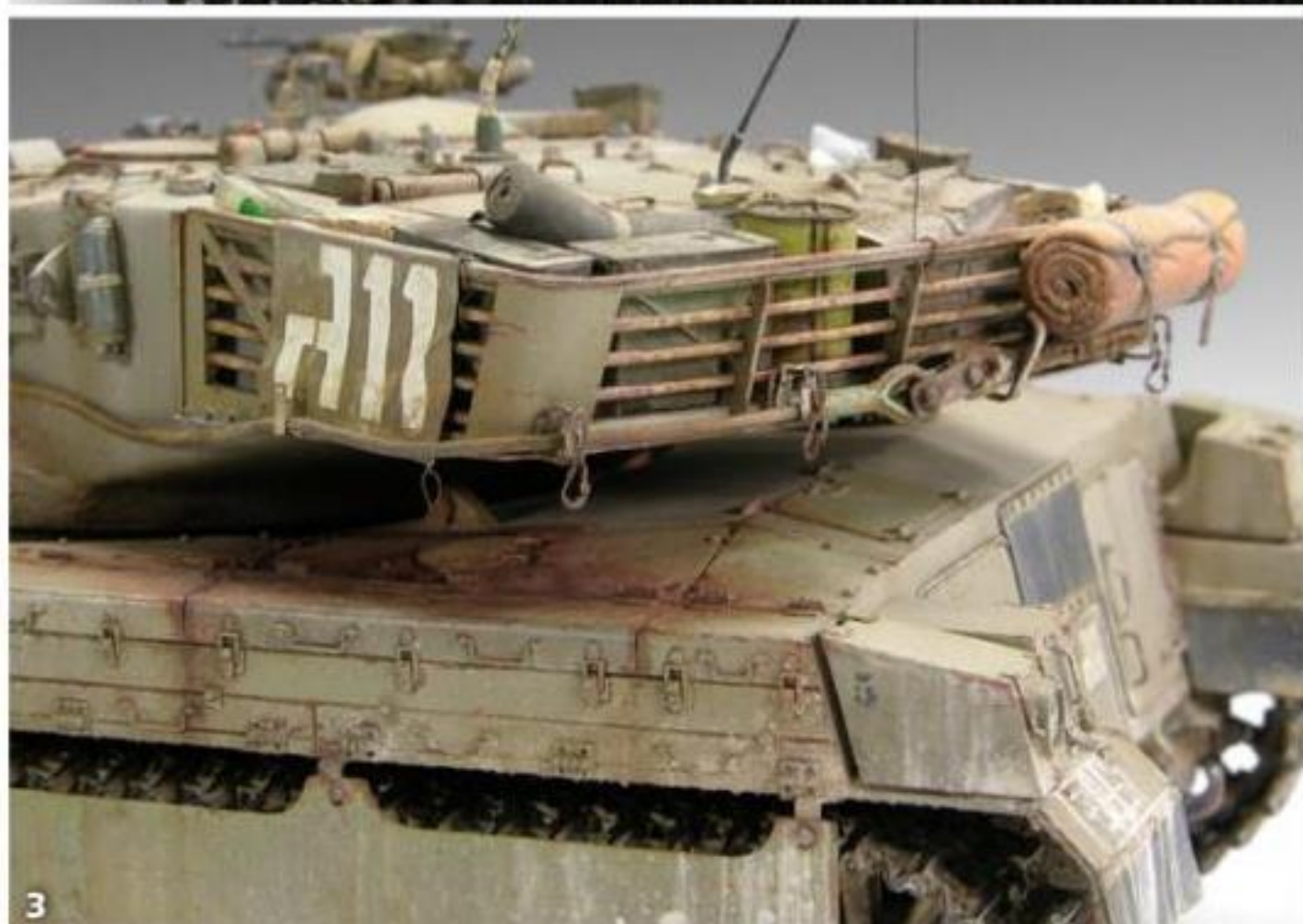


(1). Let's now see what happens with the distribution of the stowage on the heaviest vehicles. There are certain rules, such as not obstructing sights or periscopes, or blocking engine-intakes or exhausts. Vehicles such as tanks, it's important they can still rotate their turret to be able to fight. Other than that, practically anything goes! Most modern armoured fighting vehicles, have stowage bins and turret baskets, but inevitably they end up being over filled with essential items the crew need.

(2). Usually we will take our chosen selection of accessories and try to place them in the baskets before we paint them. It's a good idea at this point we should take some photos of the items in place, so as not to forget once these items are removed for painting. Each accessory must be treated like the model, taking care of the details and weathering as we do with the actual model.

(3). When painted, we can check our photos to place them as we had planned. We will fix them in place with White Glue. It is transparent once dry, but remember it can dry to a glossy finish.

(4,5). Once glued in its corresponding place, we can use diluted oils or pigments to integrate all accessories.





(6). Around the hatches it's common to find items that the crew need close to hand. Binoculars, maps, personal weapons, a water bottle or even packets of cigarettes. All are small accessories but not that easy to paint. We can observe on the side of the turret the tow cables, tools, spare track-links and an extinguisher.



(7). Interesting distribution and installation of the stowage on this armoured vehicle. Nonetheless there are many real references that can endorse it.

(8). If the vehicle does not have enough baskets or insufficient space for stowage, all gear is stacked and placed wherever there is free space. The main goal is to pack everything.



(9). If we talk about originality we have to look no further than this little teddy bear and his helmet on the front of this Bradley seen during the 2nd Gulf War. These are the little accessories that make a big difference.

(10). In the case of the vehicles operating in desert conditions, it is common to find water containers carried on vehicles. On the side of this vehicle a couple of boxes with bottles and a pair of traffic cones are enough to get the attention of the viewer.



(11). On the opposite side, next to the tools, a cooler box and a empty and crushed soda bottle again adding a splash of colour.

(12). And finally, the small turret basket is full of accessories such as mats, cans, tarpaulins, more plastic bottles and ammunition boxes in their holders.



The human factor

After placement of the accessories, we can conclude the work and feel satisfied, or we can still go a step further and add the human factor.

For the most risky or skillful with a brush, incorporating figures onto a vehicle will add some purpose and give it scale. His absence is not catastrophic in any way, but their presence always brings dynamism and personality, whether in a vehicle on a base or on the terrain of a vignette or diorama.

The methods with airbrush and acrylics are all known by all. Instead we will see how its incorporation into our models adds atmosphere and helps to tell the story of the vehicle.



(1). In this example the figures are integrated into the scene with this little Ford Mutt.

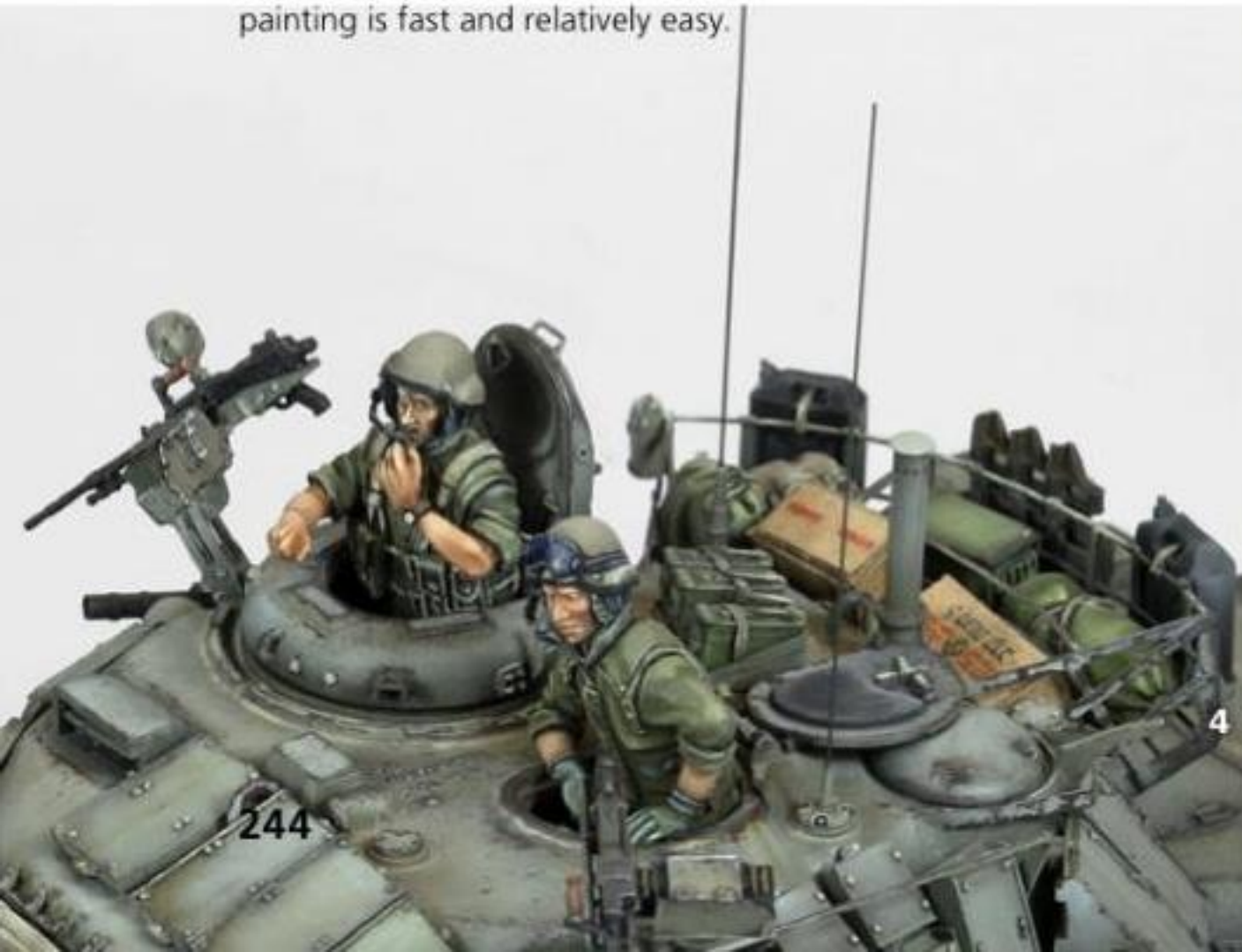


(2). In this other example it is an animal the one that helps form the link between the driver of the vehicle and the soldiers on foot. The cow on the vehicle symbolizes the harsh conditions, for both humans and animals, in the middle of the conflicts.

(3). In this photo the Commander of an M113 speaks into the microphone. This little detail is enough to present this model on a base without any terrain, but still bringing dynamism to a nonexistent scene.



(4,5). The advantage of incorporating crew members into our models is that only the visible part is reproduced so that the painting is fast and relatively easy.





6 Interesting image showing the work done with the crew of the Merkava. The work is well worth.



(7). The uniforms for the crew of this Bradley do require extra effort. If we add the chance of actually finding some figures whose poses are natural and credible we will have found the icing on the cake.

(8). Once again we are faced with another example in which, with figures the connection between vehicle and terrain or environment is made. The detail of the crew offering money in exchange for fruit to this child is really spectacular

(9). The same goes for the crew of this British Challenger. Despite being half figures, the complexity of their uniforms makes them a challenge. Once exceeded as in this case, successfully, the time and resources employed are well worth

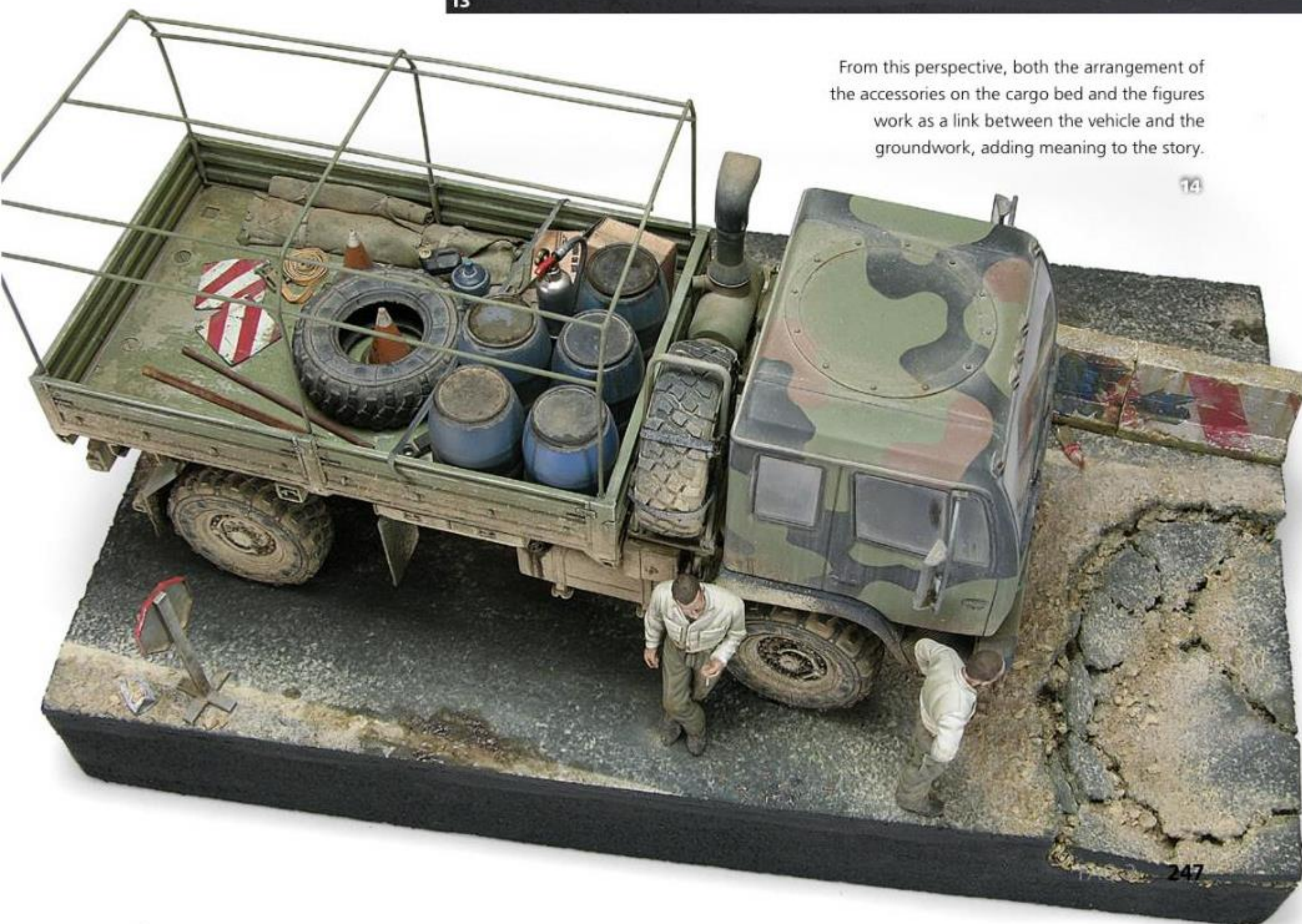




(10,11). Two examples of ideal combination, stowage and figures. If we place it everything on a groundwork we have a small vignette.

(12). With the figures it's important to pay special attention to both the poses and the contact areas between them and the vehicle. Unfortunately it's not uncommon to see the figure almost floating and not looking at all realistic.

(13). In this example, the figures on the ground convey a sense of purpose, maybe waiting for a solution that can be on the way. Obviously it is much more difficult to place them on the model. Despite this, you should try different combinations until you find the most adequate.



From this perspective, both the arrangement of the accessories on the cargo bed and the figures work as a link between the vehicle and the groundwork, adding meaning to the story.

II.12.2.

CANVAS AND NETS

This accessory can be used in several ways, either as a piece of stowage, or as a cover, either fully extended or just covering part of an armoured vehicle's camouflage.

We are used to finding this type of accessory as an aftermarket res-in part. These are produced by many companies and offer a really good quality/price ratio.

We do however have another option, that is to scratch-build one using commercial materials, this can offer great results and we can tailor to our needs. In this section we are going to see how to reproduce our own canvas and camouflage net.

In the image you can see diverse materials to improvise our own canvas or net from paper accessories, photo-etch or thin sheet metal.



In the case of a vehicle with a cargo bed, truck or similar, we will need to build a jig to recreate the framework, We can do this with either soldered metal rods. Or we can build one using cardboard onto which we will try to shape the canvas or camouflage net to avoid to damage to the metal-rod framework.



Canvas with modelling foil

(1). In this first example we are going to manufacture a canvas using a versatile material called Modelling Foil that's available from the Modelkorps catalogue. First we cut out a paper template out, then use these to cut the foil precisely to shape.

(2). This material is extremely thin and malleability, allowing us to reproduce all kinds of folds and creases with great realism.

(3). With the help of a punch we will reproduce the eyelets that will serve to hold the tarpaulin to the cargo bed or frame.

(4). Prior to punching out the eyelets the foil has been folded along the edges to represents the reinforced seam of the canvas. This foil is so malleable, these edges don't need to be glued.

(5). Once the central portion of the canvas has been cut we will place it over the cardboard frame, this cardboard jig is sturdier than the actual metal frame, and so will allow us to shape the foil without fear of collapsing the delicate framework.



5



This foil has a matte black finish, perfect for painting directly over, without the need for any primers. Once the final colour is selected, the folds will allow us to achieve an amazing result.



4



6

To paint the canvas we will start with a base colour, a light and a shade from the previous one. After completely airbrushing the canvas in the base colour, we will apply the highlights by placing the airbrush parallel and over the upper edges of the sides. We will continue painting the shadows in the same way, but from below. The natural folds of canvas will do the rest.

7



8



9

(8,9). Once we have applied the base tones, we'll have to attach the canvas to the frame. Here we can see the front section being fitted, while making sure all the creases remain natural looking.

(10,11). After placing the central part of the canvas onto the frame, the sides can be adjusted and the tie-down ropes added. Use white glue or Cyano to permanently in place once we are happy.



10



11



12



13

(12,13). In these images we can see the look of the creases and folds in the corners. Further weathering will depend of the final appearance of the vehicle, but we can use any acrylic or enamel product without any problems.

Canvas from two-part putty

(1). In this second example we are going to try to explain how to make a canvas with two-part putty coated with paper to reproduce the texture and folds. First we will have to prepare the frame on which will be placed the canvas, reinforcing it with metal rods inserted on the model to ensure its strength enough.

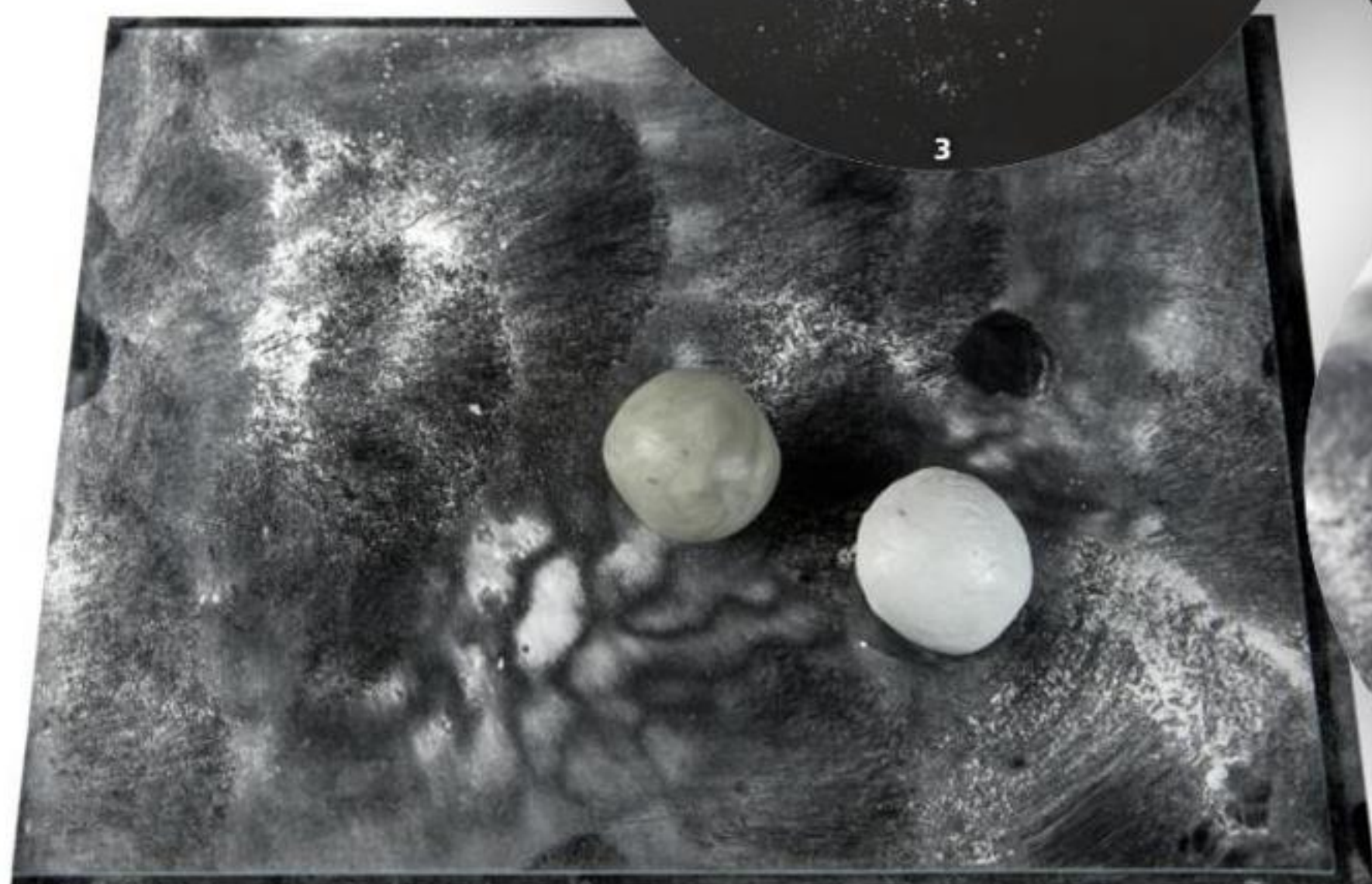
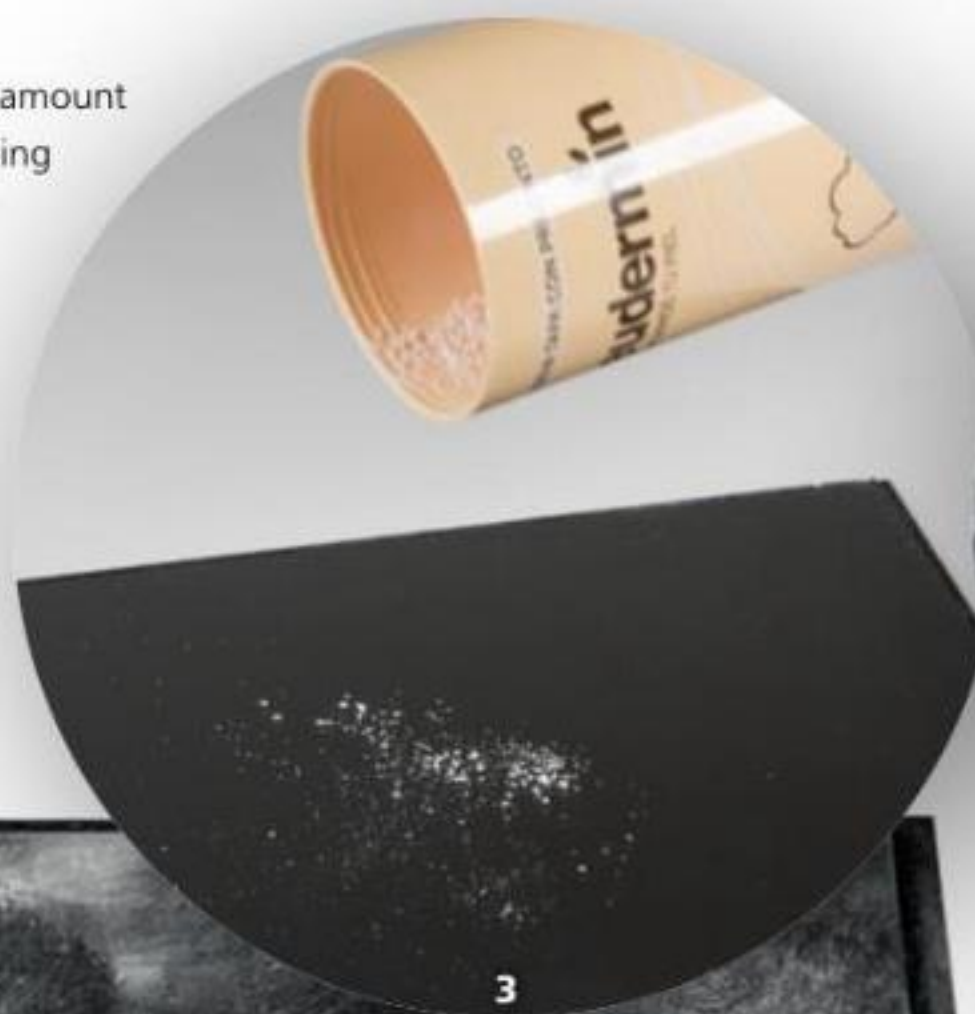
(2). The materials that we will need will be two-part epoxy putty, talcum, white glue, water and kitchen paper, along with a roller, a ruler, a soft brush, a blade and a hard-smooth working surface. Before starting work of this kind, it is advisable to test and check the behavior of the materials and tools.

(3). We will start by sprinkling talcum powder on the smooth surface on which we will knead putty.

(4). We will spread the talc evenly over the surface with our fingers to prevent it sticking to the surface and the roller.

(5). We will prepare an equal amount of each part of the putty, making sure we have enough to do all the canvas.

(6). Mix it thoroughly with our fingers until we get a uniform colour throughout the putty





(7). After being sure that it is thoroughly mixed, we will make a kind of cake or pizza with the fingers

(8). It will now need to be covered on both sides with talc.

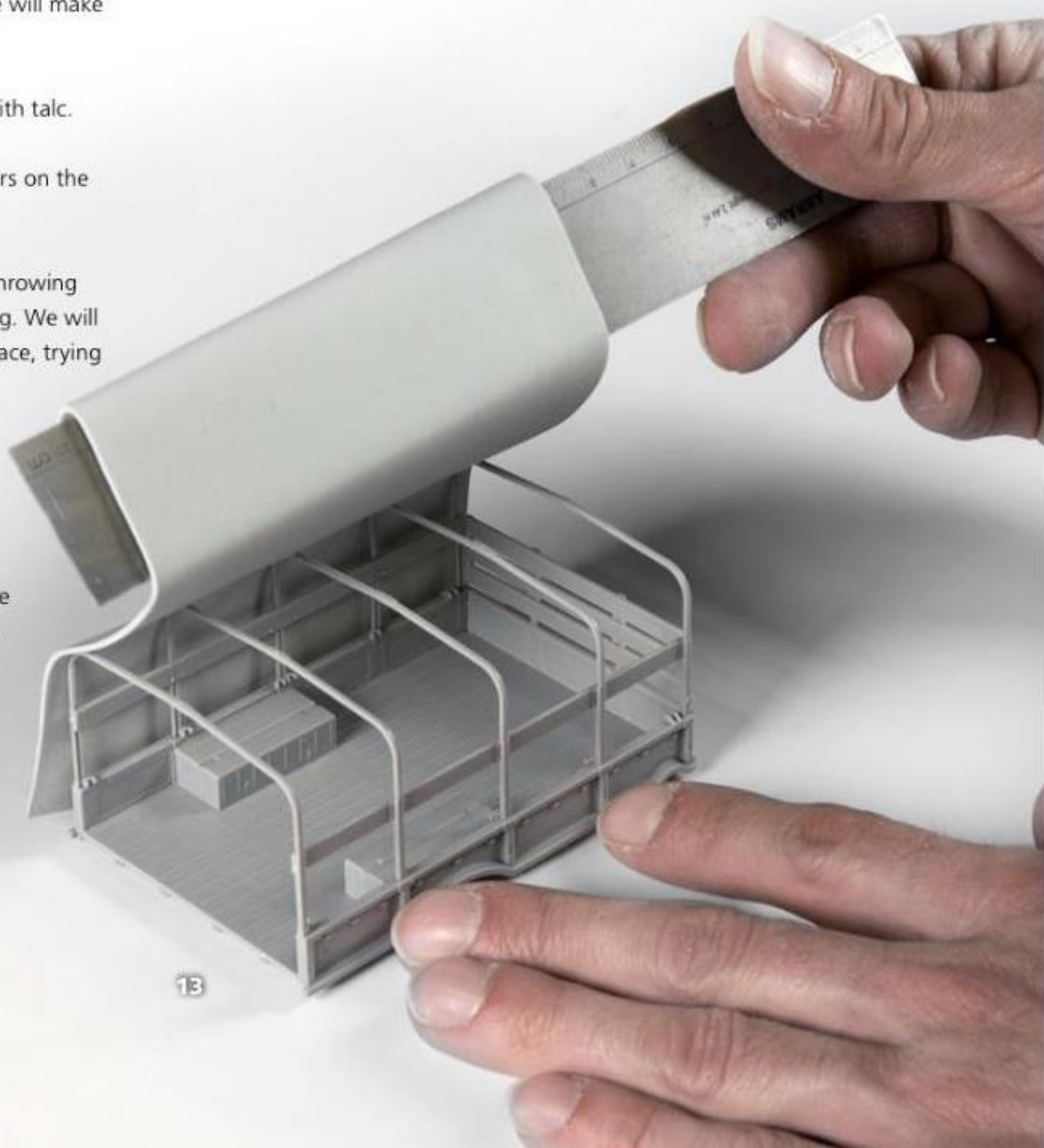
(9). ... and we will begin to extend it with the fingers on the working surface.

(10). With the roller, we begin to knead it gently, throwing talc and turning the cake frequently to avoid sticking. We will try to extend the putty over the entire working surface, trying to get an even scale-thickness.

(11). Once we have the proper thickness, use the ruler and the blade to cut into shape.

(12). We will have to plan the work beforehand. Usually the canvas will be made from more than one section. This depends on each type and model. It is advisable to make a larger shape as we always trim away any excess.

(13). Now begins the most difficult task. We will remove the putty from the working surface, placing it on the structure of the box, making sure to check our measurements.





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(14,15). After placing it, we can adapt it with our fingers creating wrinkles and sagging between the frame rails.

(16). Using the ruler carefully cut any excess.

(17). With the brush moistened in water we will begin to work each edge to create the feeling of weight and adapt the canvas to the structure of the frame.

(18). We need to now allow it to dry during for around 24 hours.

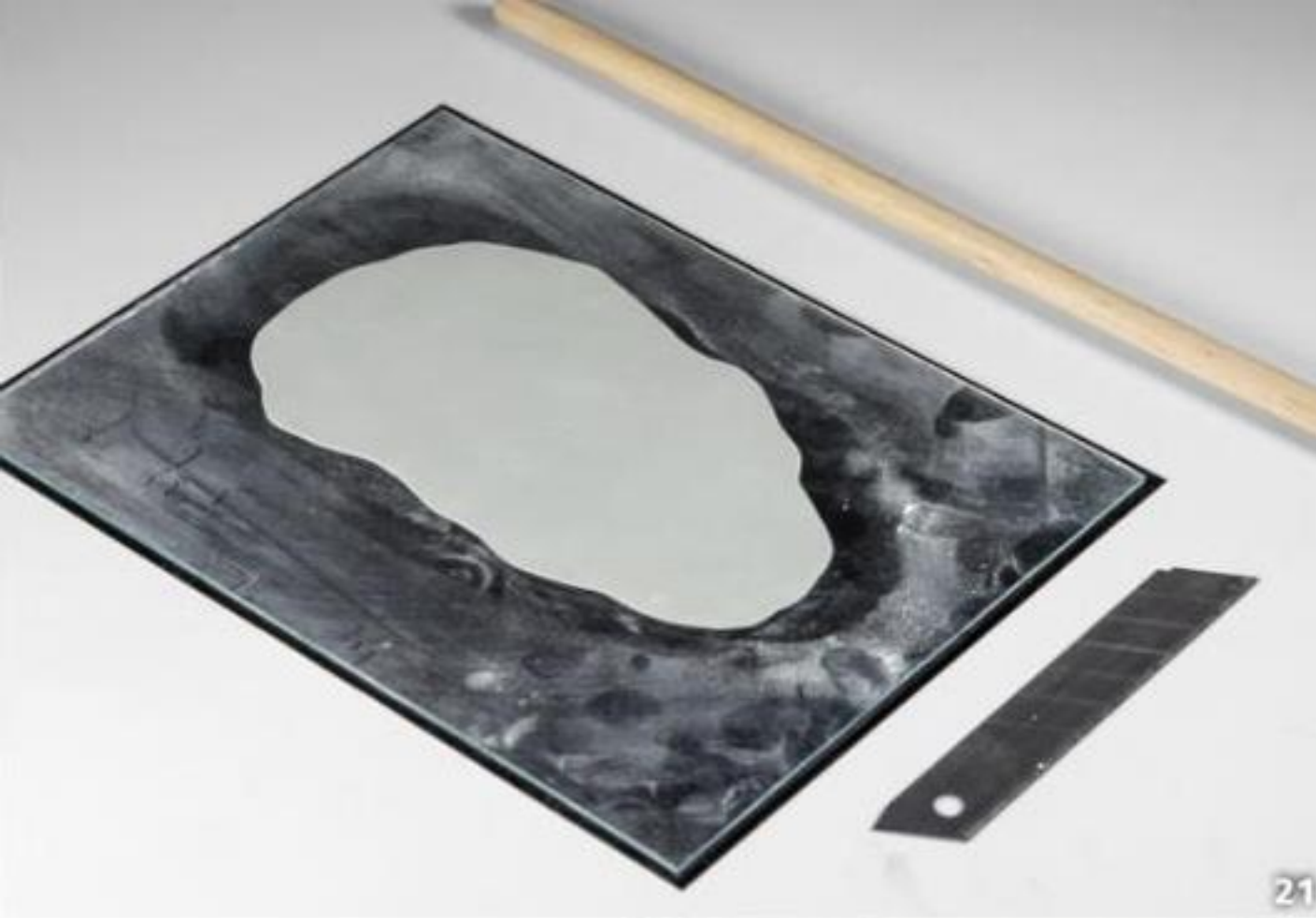
(19,20). After letting the putty dry completely, we will sand the edges of the canvas before continuing with the other sections.



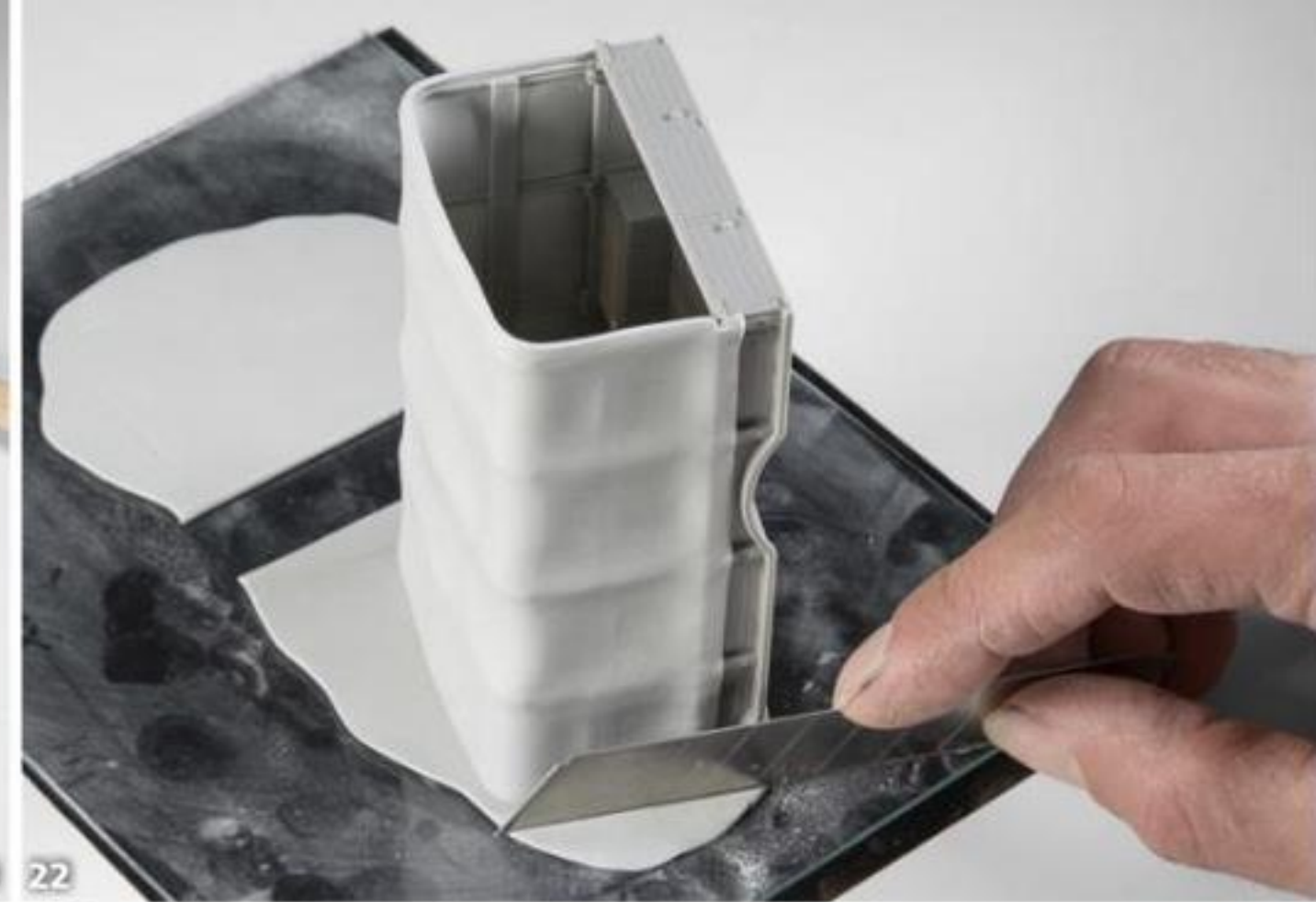
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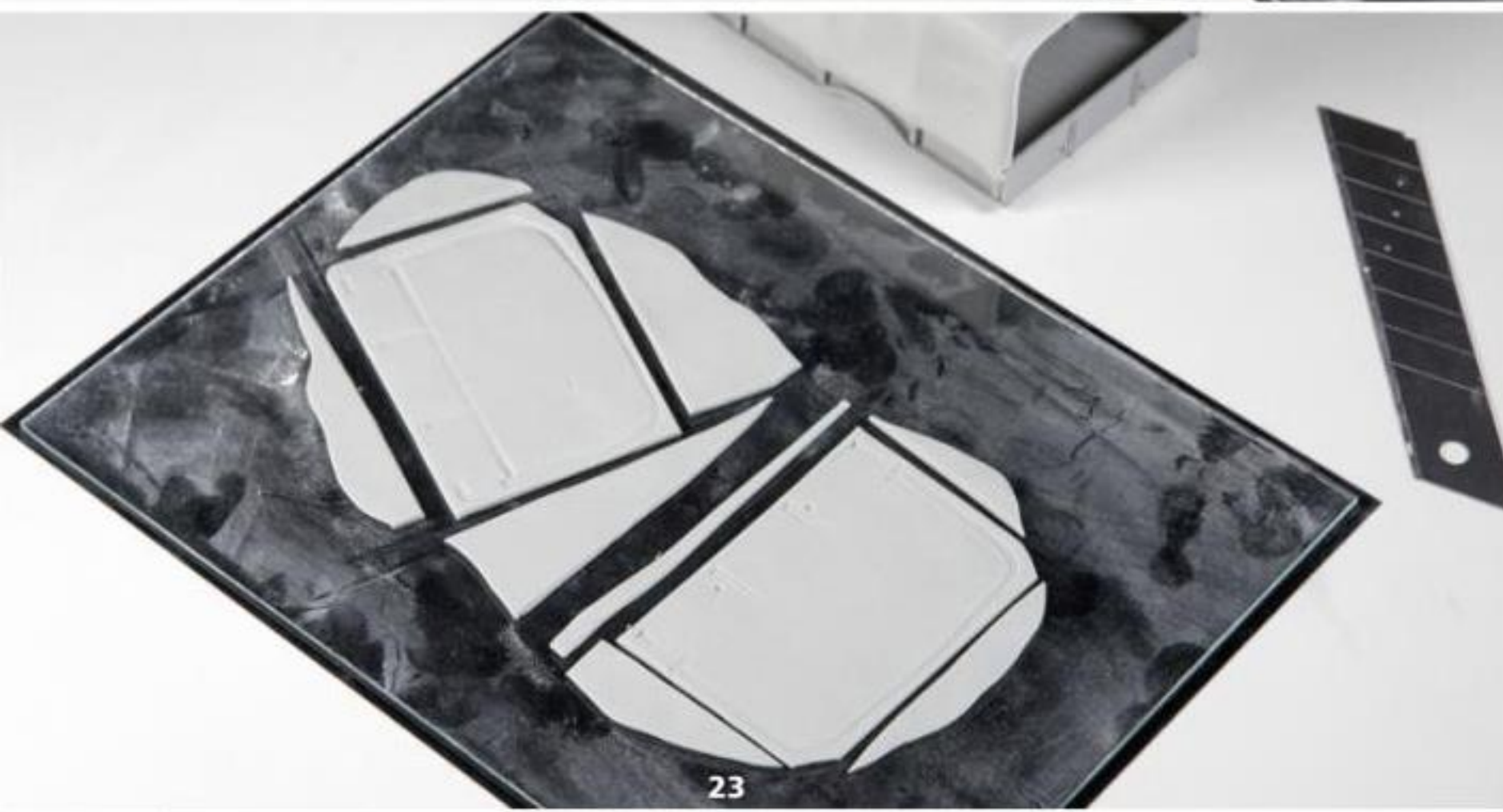




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(21). Repeat the process described with the remaining parts.

(22). Here we are using the partially canopy as a template.

(23). We will mark both edges to make the front and rear sections of the canvas

(24). Use the blade to remove the left over parts following the marks as a guide.

(25). After cutting the canvas parts, put the front in its place and manipulate it using a spatula.

(26.27). Fine adjustment will be done with the brush moistened in water. Then we can shape the wrinkles and creases.



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(28). The rear of the canopy is also the access to the cargo bed and will be displayed open and flipped-up onto the roof. The first thing that we should do, is to place it in its final position and fix it to the structure with the brush and water.

(29.30). Now we can proceed with the creases on the roof, based on reference photographs.

(31.32). If we want to represent some kind of window in the canvas, we need to mark it with a pencil and then remove it with a mini-drill. We can then sand and soften the edges and make the new covers with putty.

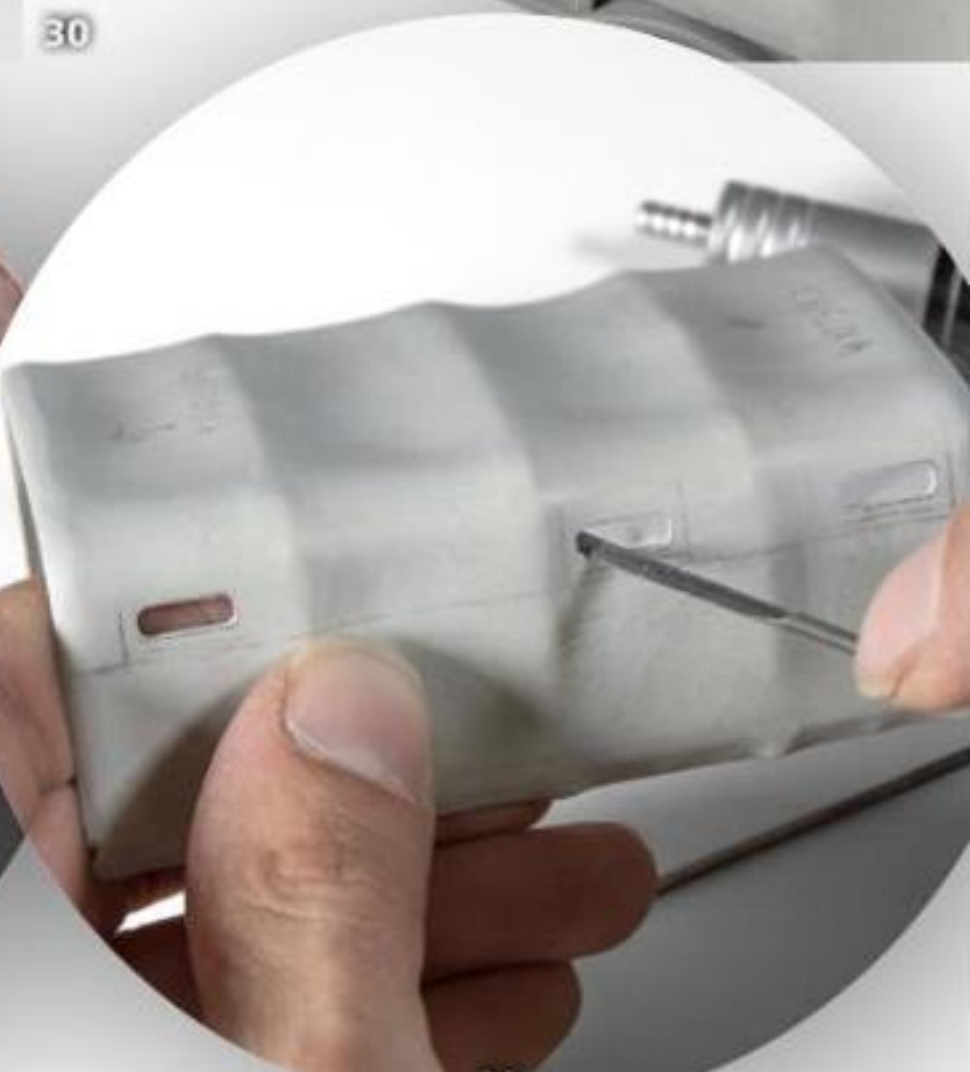
(33). We just need to apply some texture to the canvas now. We will need white glue, kitchen roll and some brushes.

(34). Starting by mixing 50% water and 50% white glue together, we can then completely cover the canvas.

(35). The quality and pattern of the paper is important, as it will determine the final texture or our canvas material. This is why it is important to do some tests first.



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(36) After cutting the paper to size, wrinkle and place it on the canvas, moistening the surface little by little. Keep in mind while the white glue is drying it will reduce its size and the paper will stretch quite a bit so you have to overdo the effects a bit.

(37) This part of the process is the most creative. Move, crump and adapt the paper as desired.

(38) After allowing the first layer of paper to dry you can add more layers making it possible to sand and soften the wrinkles. It's advisable to test the process and always base on real photographs.

(39,40,41) Once the white glue dries we can cut the paper and adjust the canvas.

(42,43,44,45) Combining putty and paper to add texture it's a great method that can offer very satisfying, original and convincing results.



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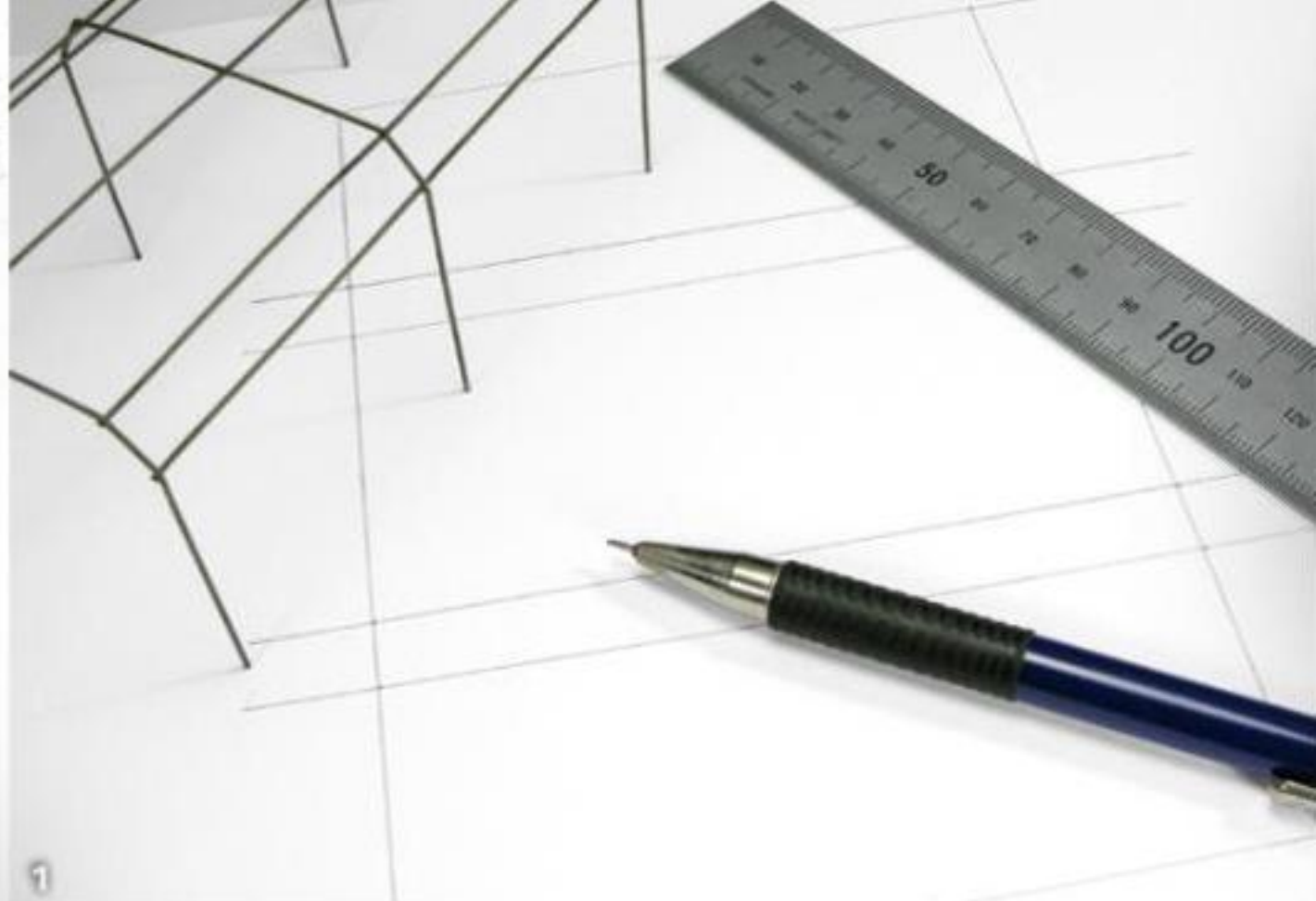
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Photoetched camouflage nets



(1). We are going to see how to combine both the paper pattern and a photo-etch camouflage net. Measure the dimensions of the metal framework and transfer these to paper.

(2). Next cut the paper with the help of a ruler and sharp blade. We are going to see how to combine both the paper pattern and a photo-etch camouflage net. Measure the dimensions of the metal framework and transfer these to paper.

(3). And finally fold it over the framework to check the result. It is advisable to leave a kind of flap or excess that we can fold and stick to the frame.

(4). Eduard has several photo-etch sheets representing camouflage nets of different colours and patterns, woodland, desert etc.

(5). We will transfer the paper pattern to the photo-etch with the help of scissors.

(6) These nets are made of pre-painted photo-etch with the advantage that the metal used is very malleable and can be folded easily to create some superbly realist results.





(7). As in the previous example, we can use the cardboard jig to adapt the different parts before final placing them onto the actual framework.

(8,9). It is advisable to check the appearance and fitment on the frame before continuing.



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As the net is pre-painted we only need to apply weathering as seen on the rest of the vehicle. Any acrylic or enamel technique will be effective as the pre-painted photo-etch is resistant enough.



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(11,12). As observed in the images the net can be rolled up and wrinkled without any problem.



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(13,14). Use Cyano glue to fix the parts to the frame and cargo bed sides. Any excess may be disguised easily with the further weathering treatment.



Barracuda nets



(1). There is another kind of camouflage net, called Barracuda, which is in widespread use amongst the modern vehicles, especially NATO vehicles. I had the chance to try a new one made of very resistant paper from Kamizukuri.

(2). The first thing that we should do is to paint it. Airbrush with the desired colour on both sides.

(3). Using a pattern made with paper, so we can cut out the necessary parts. We can use a scalpel blade or scissors.

(4,5). Being that the net is made of paper, it is somewhat more complicated to attach compared to the photo-etched metal ones used previously. Dry-fitting is best done with Blu-Tack.





6 Although it's more difficult to adapt, it can also be folded and rolled. Once cut to shape and fixed, we will add the fasteners, ropes and/or straps.



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(7,8). Use a small drop of white glue to fix the net to the edges of the frame. Once dry, with a mix of 50% water and 50% white glue, we will try to soften it and adapt it to shape adding some natural folds.



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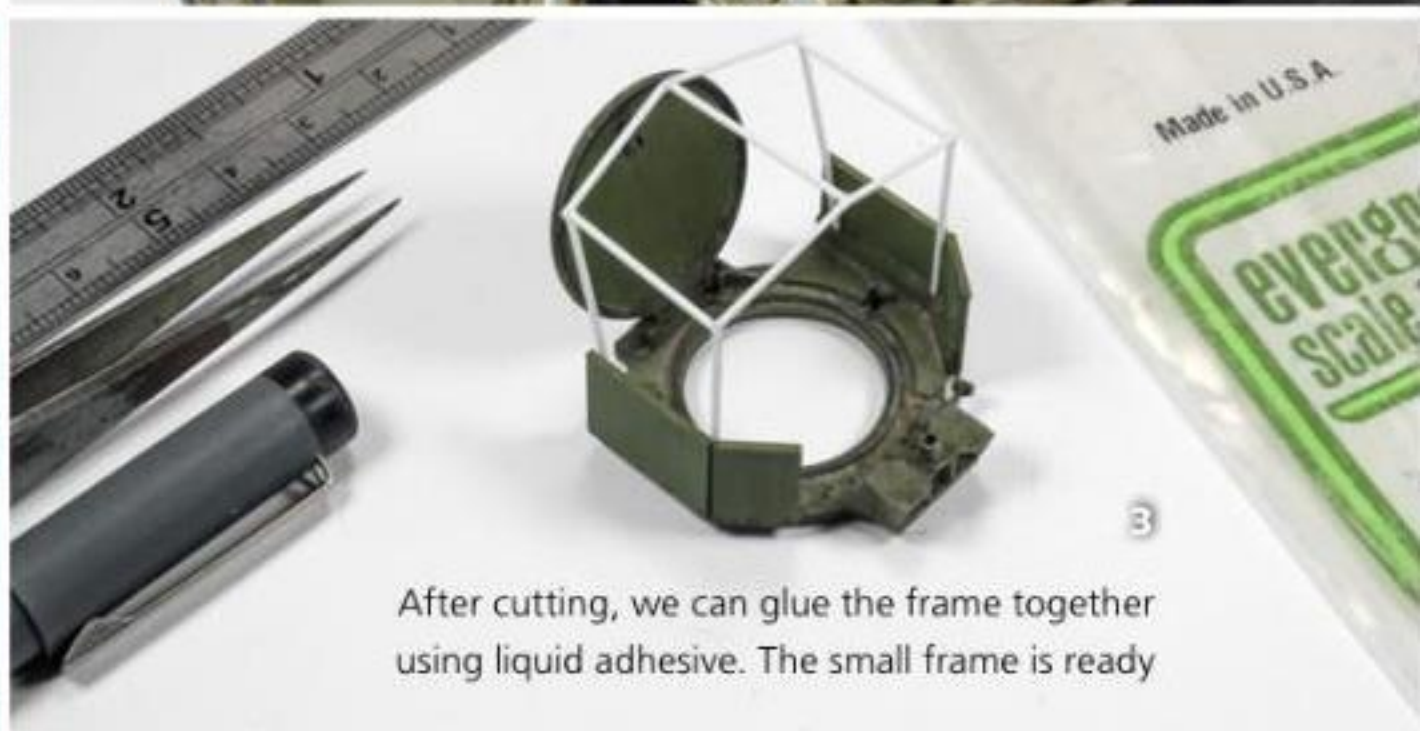
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(9,10). Once the different pieces are completely fixed to the frame, apply some weathering and blend it to match the rest of the model.

Examples and applications

Initially we will have to build the small frame, measuring and cutting plastic rod with care.

In this first example we are going to build a small sunshade with DG'S Modelling Foil that will serve to protect the gunner of this Lynx from the sun or the rain



After cutting, we can glue the frame together using liquid adhesive. The small frame is ready



After measuring the canvas we can cut out a section of the metal foil.

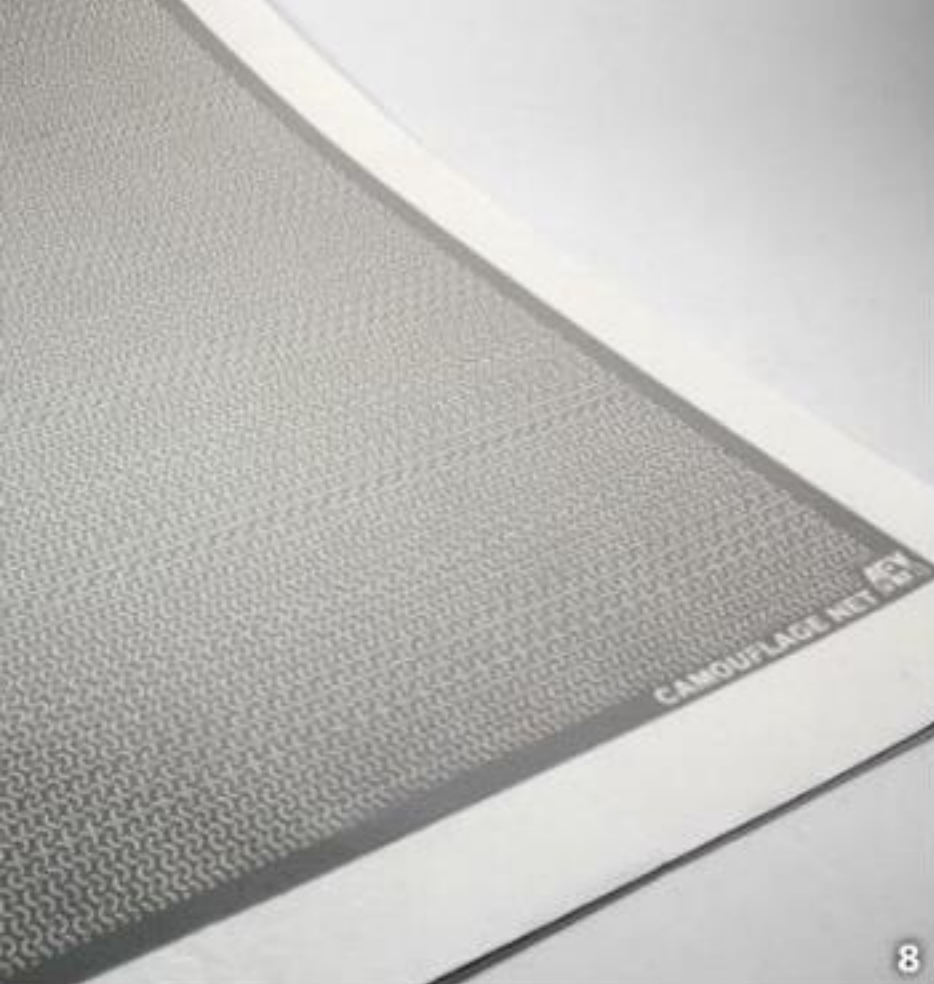


Fitting is quite simple due to our accurate measuring, we have nice small edges to fold over and secure it to the frame. Note this style of canopy has very little creasing or wrinkles.



After painting and weathering, it's clear to see what a great little addition this is to the basic vehicle and adds that personal touch.





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(8). Next we will use the paper Barracuda-netting to add a sort of improvised camouflage on the side of an armoured vehicle

(9). After cutting the size needed with the scissors, we will submerge it in water to soften it.



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Let the net dry in a similar position to its final placement over the vehicle.



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The best way to paint the net is by airbrush using either acrylics or lacquer based paints.

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We will apply a layer of AK183 Ultra Matt Varnish to seal in the paint.



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Let it dry thoroughly before adding the weathering effects.



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Apply the weathering with enamels washes, splashes and pigments.



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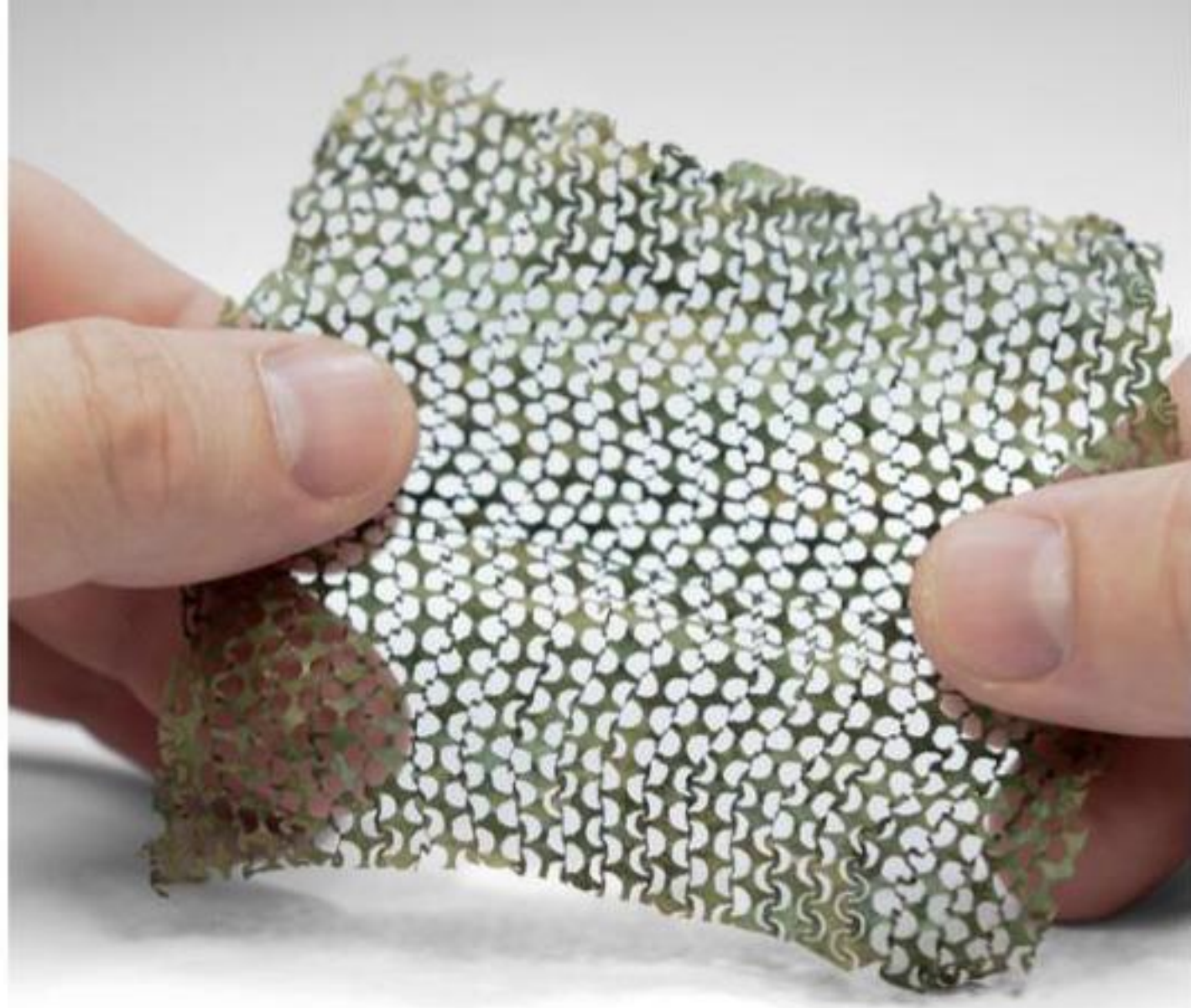
After finishing the process, we will fix the net in its final place on this digital-style camouflaged M113.



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(16). We are going to use the same Barracuda net on the following project, but as an accessory on a vehicle. This time we have applied a three-tone camo scheme using a brush.

(17). This type of net includes some perforations. Remove part of them to achieve a different look. The advantage is that the paper and the net keep the same properties but varying their appearance.

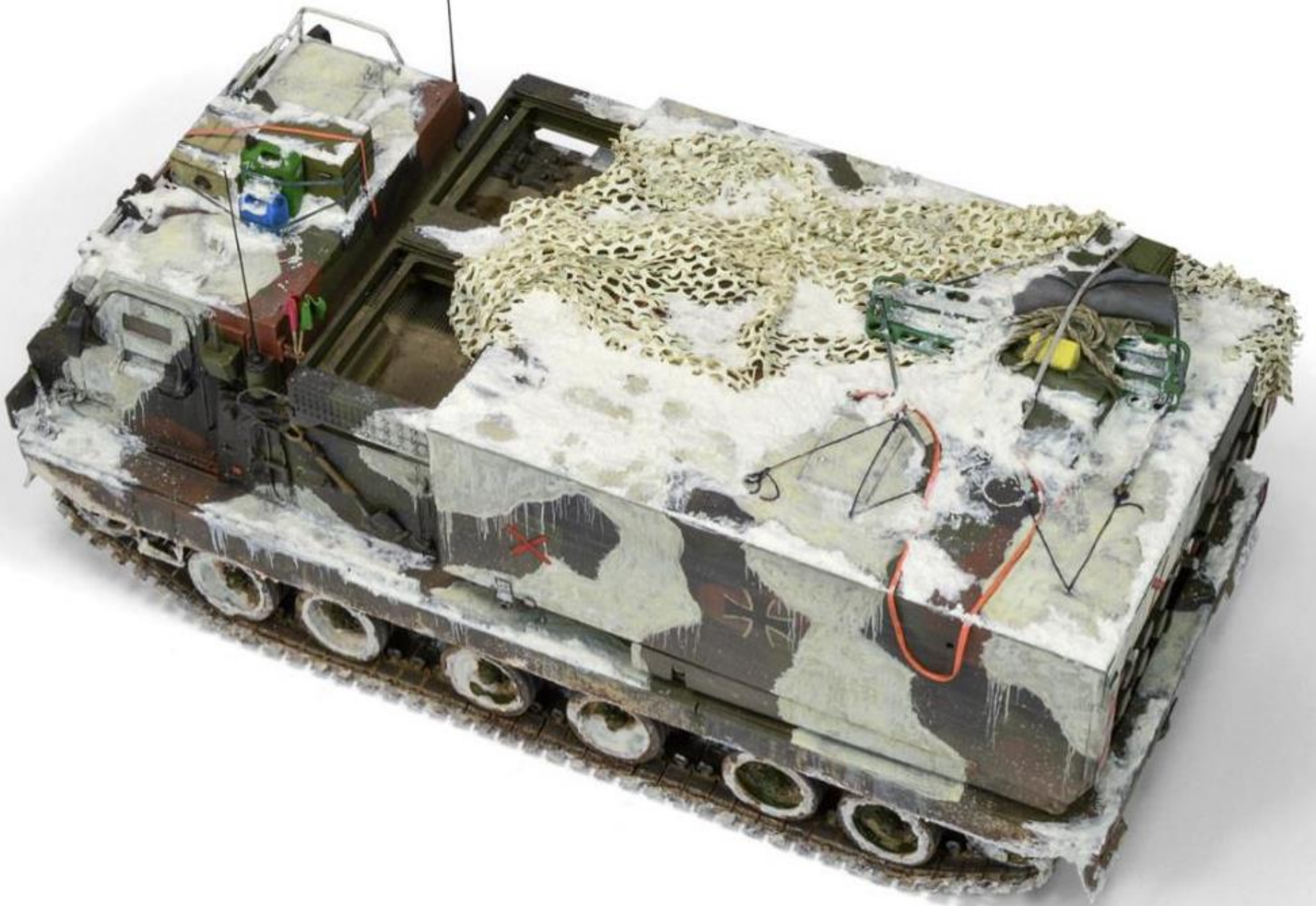


(18). After creating the proper shape and placing it on the vehicle, we soak it with a mixture of water and White Glue, softening the paper and shaping it onto the model's surface.

(19). This image shows the natural look obtained when the net is soaked and moistened.



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II.12.3.

CAMOUFLAGE USING VEGETATION

Although it is not a proper complement, it is not so difficult to find vehicles camouflaged with natural elements, such as branches, shrubs, plants and all types of native vegetation helping the vehicle to blend into its surroundings.

In modelling it is not always solved in the best way, but it is extremely attractive and interesting if a reasonable finish is achieved. In the following example we will see how to do it on a German Gepard with a frankly colourful and successful result.





1 2

(1). To begin we must choose the suitable vegetation. In this case some dried Moss. Try to use several types, helping to recreate the feeling of improvisation. In the image we find 3 types of commercial vegetation.

(2). The base on which the vegetation is added is a mix of nets and wires located in suitable parts of the vehicle, such as handles, hooks or tie-down loops. Place the net in its desired position and fix it with white glue diluted in water.

(3). We also place fine copper wire between different parts of the vehicle to hold the branches and the vegetation.

(4). Before painting, we carried out a test to verify the results. These tests are always necessary, since they allow us to find the correct method of application.

(5). Both the net and the metal wires will be painted with the rest of the vehicle to integrate them perfectly.

(6). After concluding with the painting process and weathering of the vehicle, we place the vegetation based on previous test fitting.



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(7,8,9). After fixing it with White Glue and let it dry, we will have to integrate it following the same chromatic guidelines employed on the vehicle and baring in mind the environmental conditions.

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(10,11,12). In this sequence of images we can see how the treatment of the vegetation has varied by zones. While in the upper ones keep the bright colours, in the lower ones they are attenuated by the accumulated dust and mud.



Final look of the vehicle
with the camouflage
added and fully
integrated.

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III. WEATHERING



CHAP.: 1

Among modelers, the term “weathering” refers to a set of processes that helps transform a lot of plastic, resin and metal parts in a bit of reality.

In this section we will use a variety of products with different characteristics, applied in different ways, with different end results. What can be seen as chaos in the beginning will become more ordered as we move forward in the weathering process.

To achieve order and leave the path of chaos we need to have a set of things clear from the start. We need to have the main goals of the weathering clearly in mind.

The task of setting objectives and goals, together with the ability to be critical, is what should guide the weathering process. This is not easy. In fact, the easy thing is to get lost along the way. Instead of getting discouraged we should be able to take a step back from time to time and learn from our mistakes.

Make no mistake about it, everybody needs to learn. Even the most committed people still make mistakes. The strenght to improve lies within ourselves.

Not everybody is willing to try. Sometimes it's a matter of time; sometimes we don't have the means or we don't want to come out of our comfort zone. In any case other people's work can often be a guide.

After having covered different techniques in the previous part, in the next section we will deal with the complete weathering process on vehicles in certain climate conditions, or with specific base colours. What is important is that we will see detailed descriptions and also a generic weathering process. That will prevent us from getting lost between the when and how to apply each technique. We will also advise on when to use a certain technique and not the other.

Light vehicles

Once we have studied the weathering process and considered all possible steps, the required means and techniques and the effects we want to achieve, we can say that we have a plan.

In this chapter and the next one we will put all this knowledge into practice. We will create examples by weathering a number of complete vehicles.

We start with the smallest and lightest vehicles. In the following chapters we move up to medium vehicles and we keep the heavier ones for the end.

I chose this approach for two obvious reasons. First, it is easier to apply the techniques on small surfaces. It takes less time to figure out where to place the effects, the stains, etc. Second, a smaller size also determines the size of these effects, resulting in fewer errors during the whole process.

I have also tried to make the examples as representative as possible for working with colour, setting, finish and features to create a more complete and attractive weathering job.

B11 RECOILESS GUN

This little RG107 recoilless rifle, is a Soviet weapon with a smooth 107mm bore. It entered service in 1954 and it was usually towed by a ZIL-157 6x6 truck or a UAZ 4x4 Jeep. Its wheels and light weight allowed for great mobility and it was used successfully as an anti-tank gun. Usually requiring a 3 or 4 man crew, it could be put into battle in around one minute and is still in service in some armies and irregular forces around the World.

The one that we are going to represent belongs to the Egyptians and used during the Six-Day War in 1967. We're going to represent a gun that has been put out of action, showing signs of rust, little maintenance, dust and obviously a wrecked barrel, where an explosive charge has been placed into the muzzle.



(1). The first issue that we need to address is the issue of the muzzle brake. To get an idea of the result we need to base our work on some photographs. Thankfully as the barrel is resin, we can simply drill it and heat it to achieve the desired effect.

(2,3). From now on, everything is focused on the painting and weathering, always focusing on achieving an abandoned, dusty and rusty finish. As we will be working with chipping fluids, we start by airbrushing on a layer of red rust.

(4). Next we will airbrush on a generous layer of AK088 Worn Effects before allowing to dry for at least half an hour.





(5,6). After airbrushing the green base colour, we will apply some greenish yellow dots, resulting in a very typical camouflage for this conflict. Next, using a hard-bristled brush moistened in water we will chip the areas of the barrel and the base.

(7,8). In the case of a model with a small surface area, we skip the filters, applying some washes instead. We will apply AK2071 Paneliner to help the camouflage stand out from the crevices and recesses. The excess is removed with clean White Spirit.

(9,10). The next phase is weathering with oils. On the palette we include Abt.001 White, 035 Buff and 093 Earth. These will help add wear and tear and also recreate the accumulation of dust.



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We apply the first rust traces with the application of AK706 Light Rust and AK707 Rust acrylics with brush in the form of chips and scratches.



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(13,14). It is completed with the application of enamels and oils mixed together to blend over the previous chipping. We will use AK013 Rust Streaks enamel combined with 070 Dark Rust, 020 Faded Dark Yellow and 093 Earth oils.

(15,16,17). After the application of oils, they are attenuated with some dust effects that we will apply using Buff coloured oil paint, later blending with White Spirit. Given the reduced size of the piece we will only work on the horizontal areas and tyres.



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(18,19,20). The dusting phase will be carried out entirely with dry pigments. We will use AK040 Light Dust, 042 European Earth and 143 Burnt Umber that we will deposit with a brush around the wheels and in the recesses of the legs and upper part of the barrel. After applying them without fixing, we can gently rub some of the areas with a finger simulating some friction or the handling by someone trying to move it or push it out the away.

(21,22). The dust in the muzzle will highlight some details of the damaged area and interior.

(23,24,25). In the next phase we will try to represent grease stains, oil and some other wet effect using Abt.002 Sepia oil and 160 Engine Grease combined with each other and applied to the axles and other moving parts. Finally we can splash some stains on the tyres or any other area.



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Finally we will try to depict the bare metal areas such as the handles and elevation mechanisms and sight using graphite pigment or a graphite bar rubbing with the help of our fingers or a cotton bud.



B11 Recoiless gun
MIG PRODUCTIONS

III.1.2.

M151 IDF MUTT

In 1951 the United States Army requested a light vehicle to replace the old Willys M38 still in service. The proposal from Ford was a small vehicle of less than 1000 kgs. in weight, called MUTT (Military Utility Tactical Truck). The A2 version entered service in 1970 and could be identified by its large indicators located on the modified front fenders. It was used as an advanced Command Post and had an anti-tank

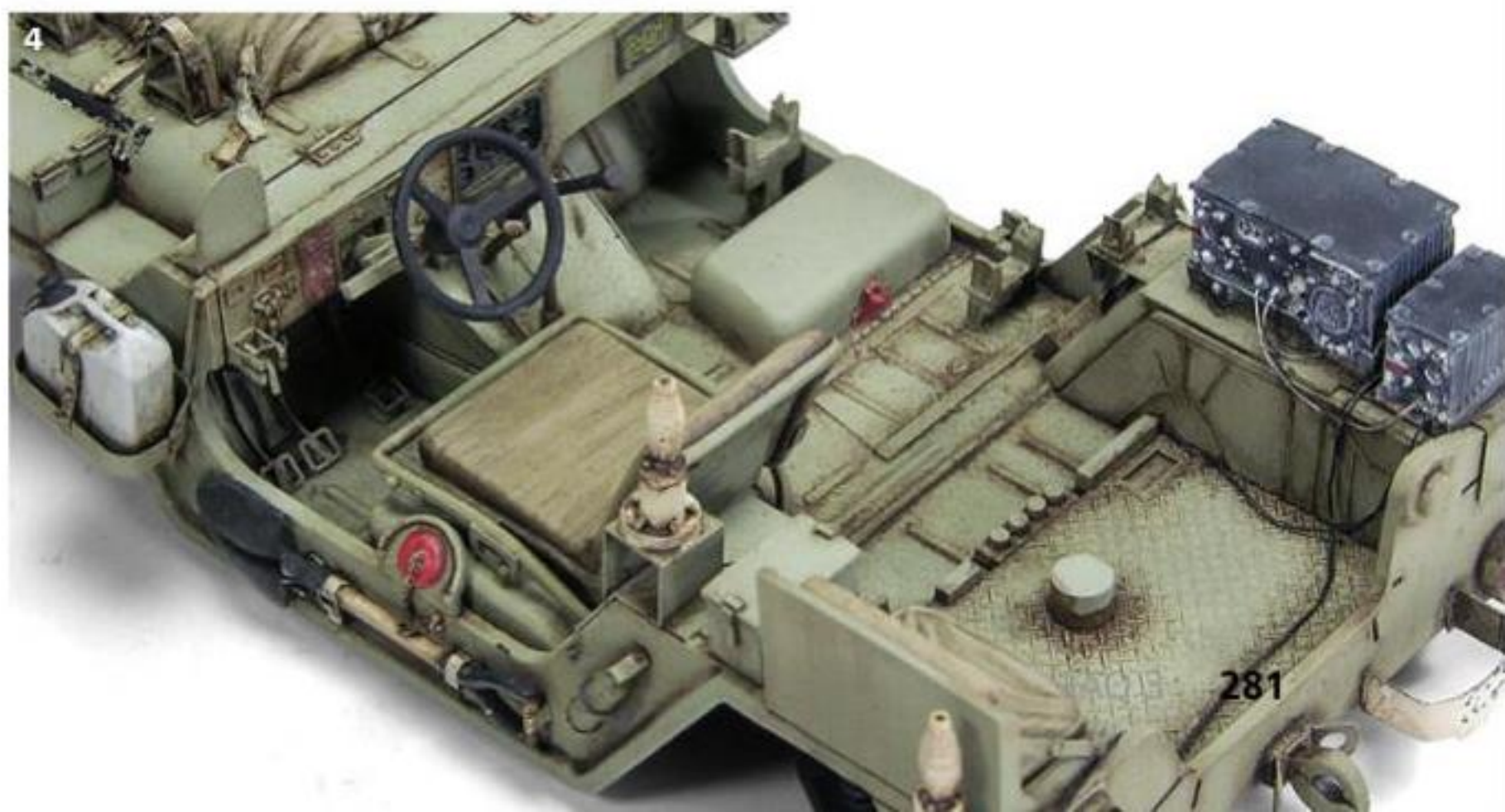
TOW missile system with optical tracking. All variants were widely used during various conflicts in the Middle East. The one that we are going to represent, belongs to the Israeli Defense Forces deployed during the Lebanon War in 1982 during the occupation of Beirut. The model depicts a vehicle in urban combat, fully equipped and with the usual traces of daily use in the city, dusty and with little maintenance.



(1). Once the base is airbrushed, (see PII. Techniques – C3 Plain bases) we can apply the washes. We use a mix of AK121 OIF&OEF and Abt.080 Wash Brown oil diluted with Abt.112. This matt effect thinner helps to achieve an ultra matt finish without any shine.

(2). After a few minutes we can clean off the excess, leaving just some traces in the nooks and recesses. Use a brush moistened in thinner cleaning the brush from time to time. A flat brush is advisable.

(3,4). The wash is applied over. Once dry must remain a clean surface with all the details outlined, so we have to invest some time to achieve a nice result.





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(5,6). On larger vehicles it is more comfortable to work with sub-assemblies, as in this case with the TOW launcher. Before the washes, markings have been added and some of the detail painting in place, including the dashboard and the radio so they are fully integrated.

(7,8). The application of oils will allow us to simulate wear and tear and dust in a selective way. We will use a palette similar to the previous example with a predominance of earth tones. Apply the oil in a timely manner over the whole horizontal surfaces, cleaning later with White Spirit.

(9). The oils are very versatile and also allow us to simulate dust. Applied in form of splashes on the inner part of the spare tyre simulate the accumulated dust in this area.

(10,11). Also the oils should be applied to all parts of the model that get covered in that light layer of urban dust.



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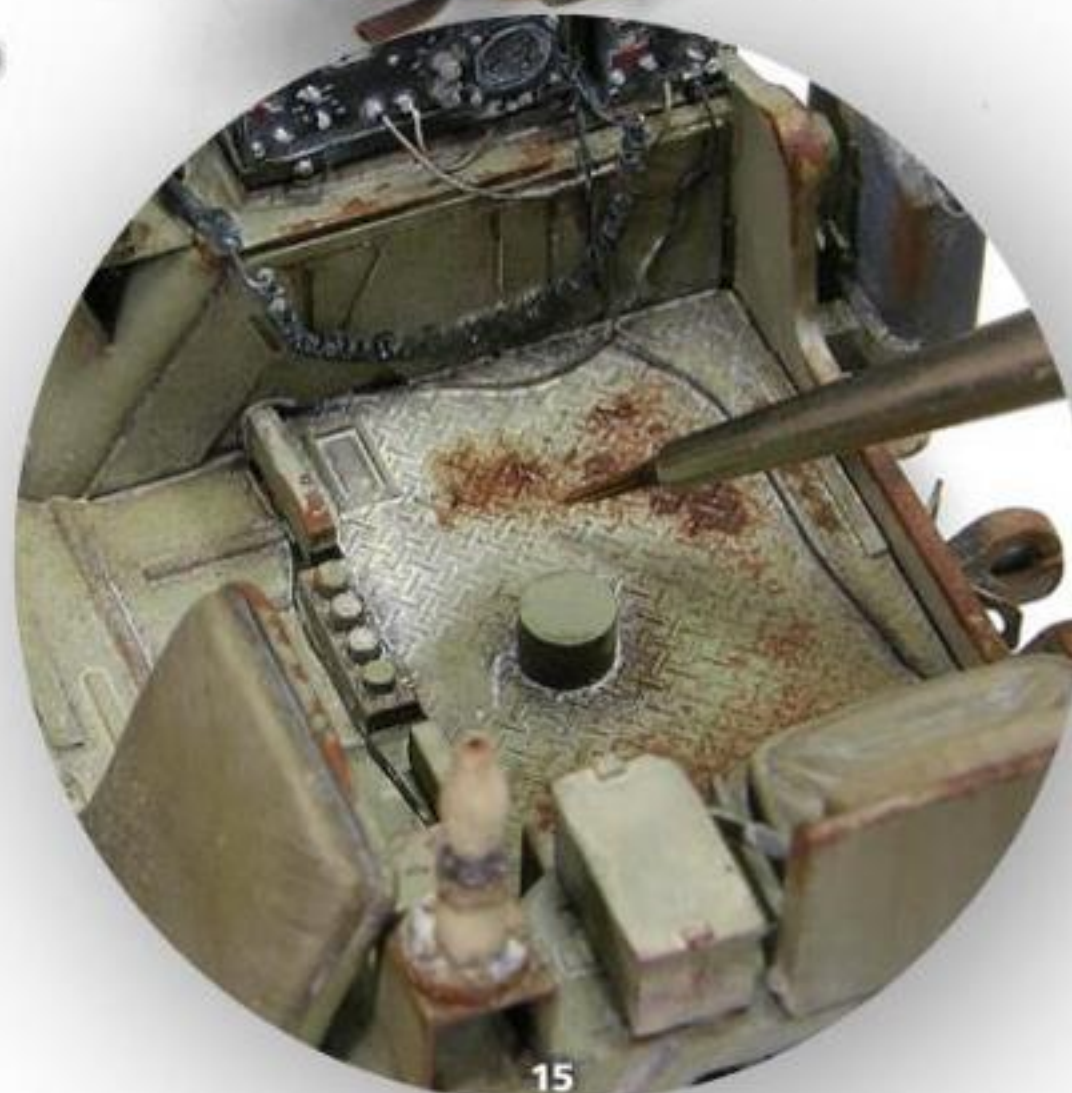
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(12,13). The chipping phase is done mainly using acrylics, shades of dark red and rust without painting the light edges of the scratches. We will apply them with a fine brush and even with a sponge in the rear area because it's large enough.

(14,15,16). On previously chipped areas we will represent some rust by using a combination of oils and enamels, all in rust brown and orange tones. Paint them with the tip of the brush, blending with clean thinners.

(17,18). For the dust we have chosen AK143 Burnt Umber and AK147 Middle East Soil pigments especially in corners and recesses in which the earth accumulates. After applying them we can move them to selective areas with a fine brush.



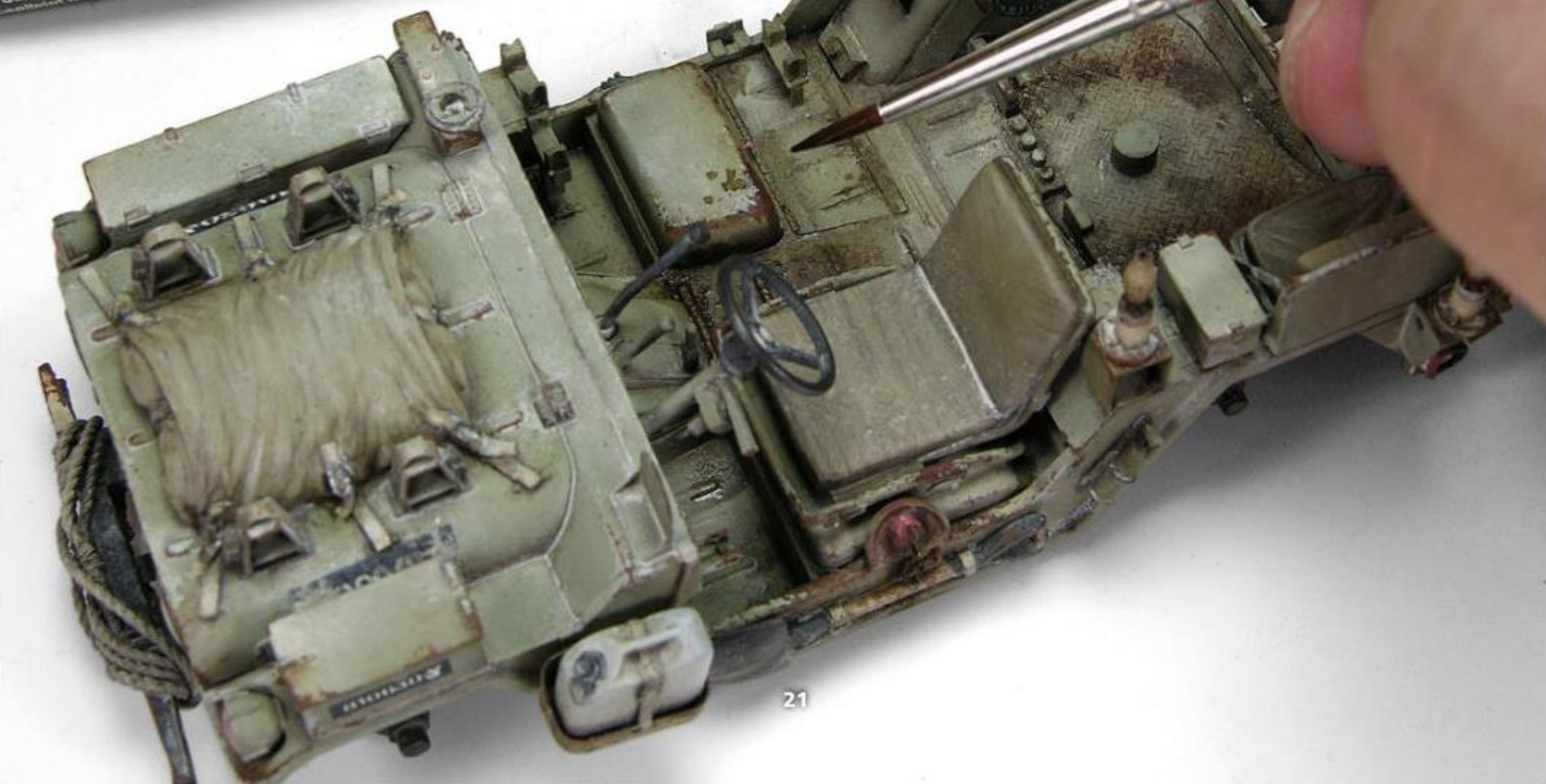
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(19,20). On the wheels we will try to distribute them in the tread and between the rim and the tyre. Once applied we will rub the sidewalls and treaded portions of the tyres with our finger. The reason is the final location of this vehicle on an asphalt road. The treatment received in the spare wheel is different. We must take care of all the details.

(21). The final phase of wet effects involves the application of stains from different origin. Use AK025 Fuel Stains mixed with Abt.160 Engine Grease oil paint and a fine brush to add such effects.



M151 IDF Mutt
TAMIYA



III.1.3.

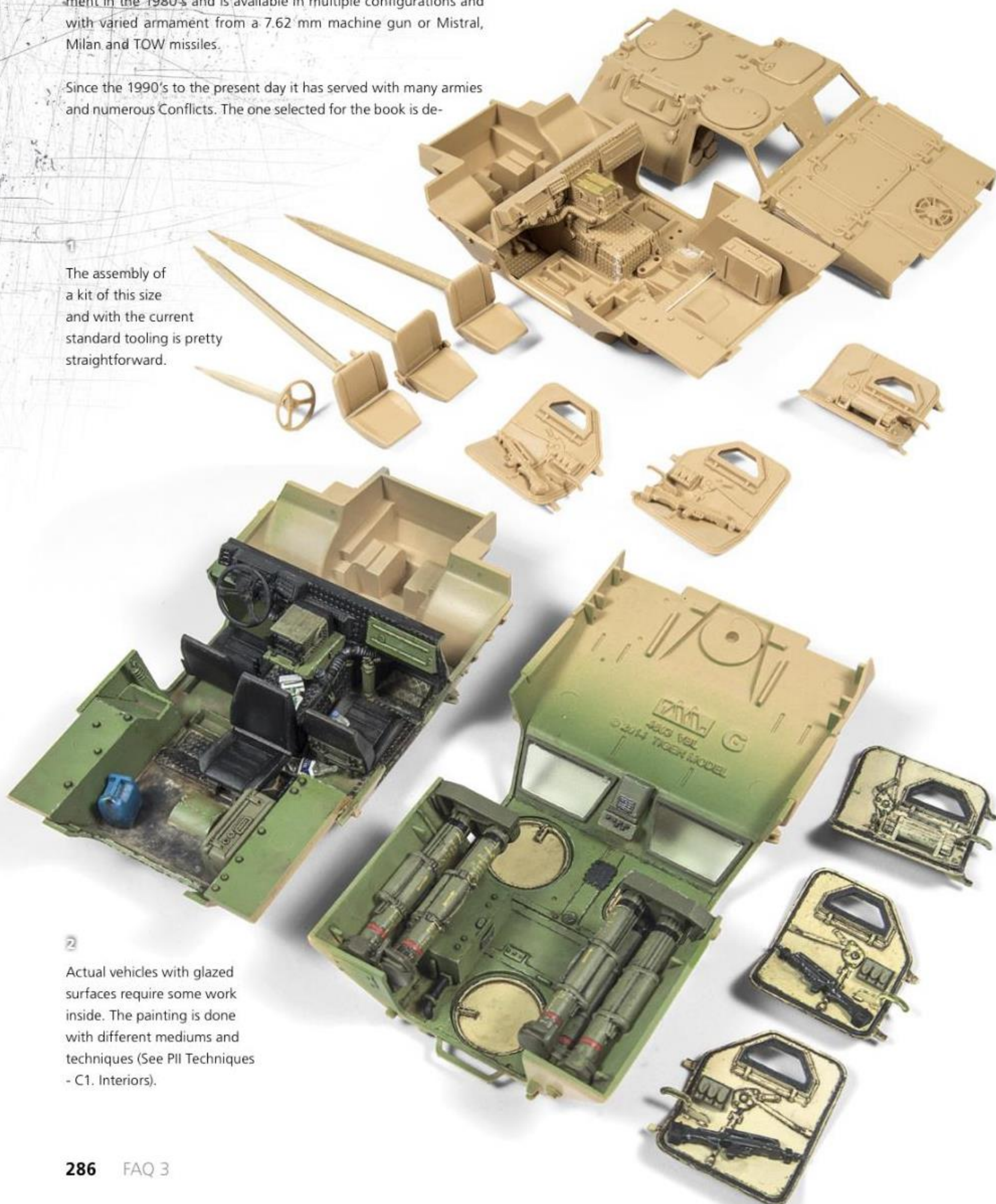
VBL PANHARD

The Panhard VBL (Light-Armoured Vehicle) is a small French vehicle equipped with light 11.5mm armour that offers protection against artillery splinters, grenades, anti-personnel mines and up to 7.62mm projectiles. The Panhard company started its development in the 1980's and is available in multiple configurations and with varied armament from a 7.62 mm machine gun or Mistral, Milan and TOW missiles.

Since the 1990's to the present day it has served with many armies and numerous Conflicts. The one selected for the book is de-

ployed in a desert area depicting a typical French desert camouflage of sand and brown used during the Operation Daguet in the 1991 Gulf War. These vehicles were usually covered in a large amounts of dirt and dust. We will try to represent a vehicle in these conditions.

The assembly of a kit of this size and with the current standard tooling is pretty straightforward.



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Actual vehicles with glazed surfaces require some work inside. The painting is done with different mediums and techniques (See PII Techniques - C1. Interiors).



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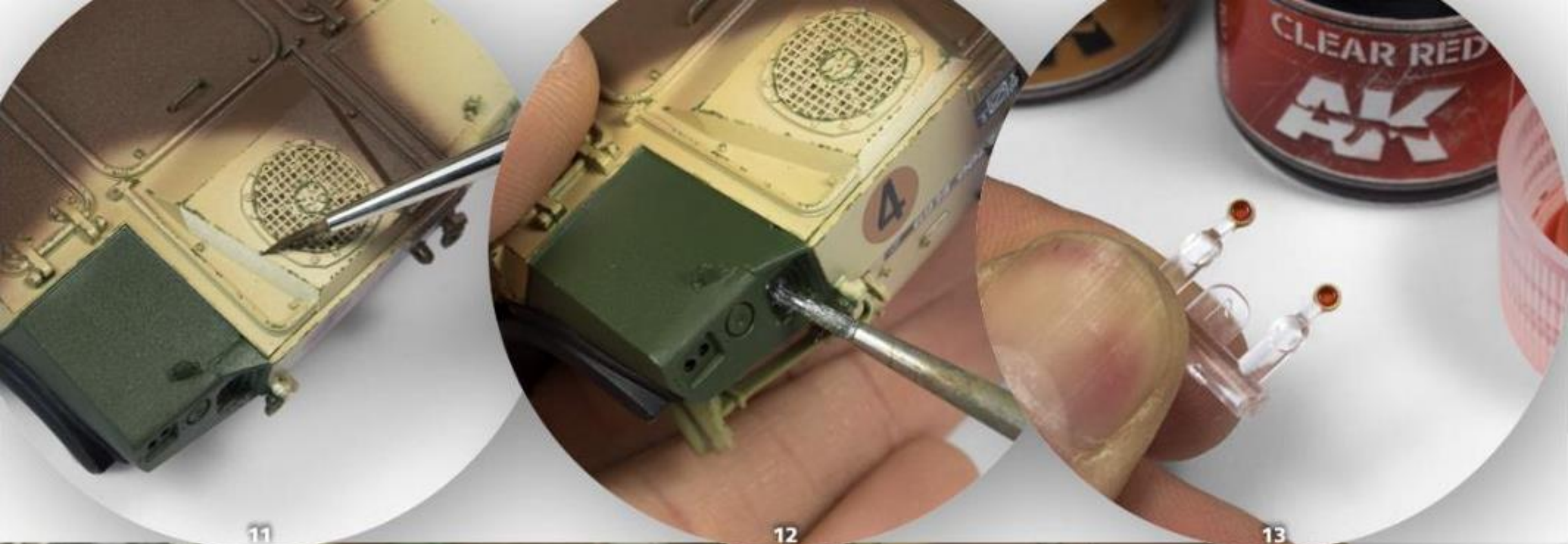
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In this sequence the painting and camouflage processes are summarised, beginning with the application of a primer and then the Real Color AK range. After applying and modifying the light sand colour to provide a certain variety, first we airbrush the edges of the camouflage pattern and later the interior is brush painted. During this process, if necessary, certain areas of the vehicle that require a different colour can be masked.

The process continues with the application of the decals, always over a layer of gloss varnish and with the help of AK582 Decal Adapter. After unifying through the application of satin or matt varnish, the process concludes with detail painting using acrylics.



(11). The paint applied over the NATO Green tone doesn't seem so durable and can easily be chipped. To represent the chips will use a light green acrylic applied by brush in the most prone areas such as corners and edges.

(12,13). Once the chipping phase is over, we can now fit the headlights. The interiors were previously painted in silver. The optics are painted with clear lacquers, fixing them with white glue.

(14). Use earth oil tones blended with White Spirit to add more visual richness to the surface.

(15). AK075 Dark Wash is ideal to highlight all the details. The more subtle we are when applying, the less work will take to clean it any excess

(16,17) The overall look of the vehicle after painting should be clean and neutral. From now on, we start to add character during the process of weathering.





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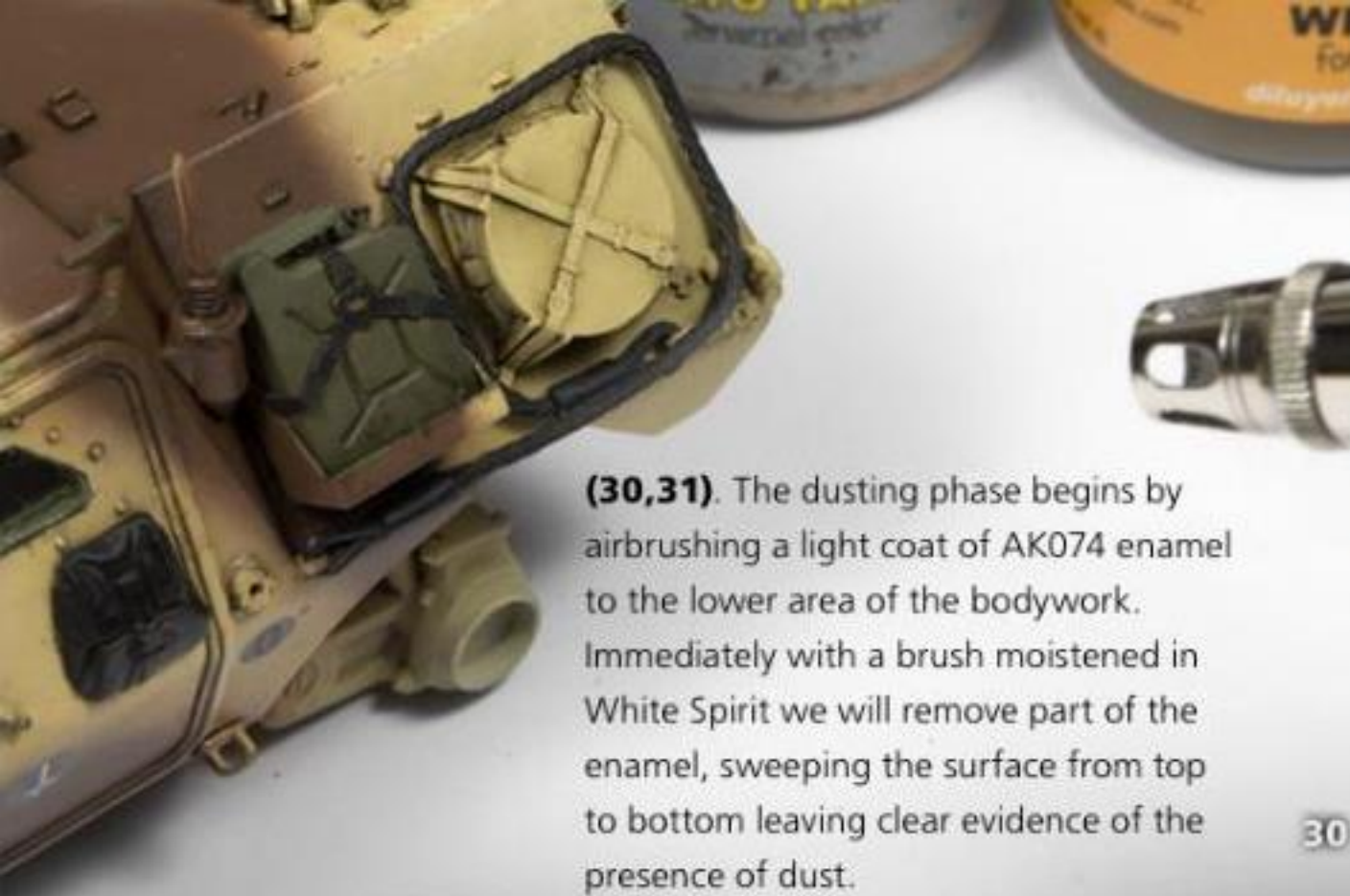


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On this page we can see the complete sequence of painting and weathering of the wheels. The decisions made here should also be used on the bodywork.



(30,31). The dusting phase begins by airbrushing a light coat of AK074 enamel to the lower area of the bodywork. Immediately with a brush moistened in White Spirit we will remove part of the enamel, sweeping the surface from top to bottom leaving clear evidence of the presence of dust.

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(32,33,34). We will continue applying AK022 enamel with a clear appearance on the horizontal surfaces that we will blend and distribute with some thinners. Dry pigments helps to reinforce the sensation of dust and accumulated dirt.

(35). The general look, although not extreme, shows the desired sensation and allows you to mentally transfer the vehicle to the arid desert environment in which it could be operating.

(36,37,38). The process ends with dirt on the chassis and lower hull, in this case only the wheel arches. Airbrushing AK4062 and then partially removing it, as we did with the bodywork. This earthy appearance can be complemented with dry pigments to create more volume. Finally with a mixture of Abt.007 Raw Umber oil paint and AK079 Wet Effects we add oil and fluid stains.



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Panhard VBL
TIGER MODEL



III.1.4. IVECO LMV LINCE

The LMV Lince (Light Multi-role Vehicle) is a tactical 4x4 vehicle developed by the Italian firm Iveco. Its modular armour allows level of protection to be adjusted to suit the level of protection required for each mission. The suspended crew seats come from aeronautical research and its 'V'-shaped lower hull deflects mine blasts. Its structure is in the form of a removable sandwich in the floor allowing it to absorb the blast from IED's.

Its use in combat has been totally decisive when it comes to saving the lives of its passengers. Its mobility is improved with a 'run-flat' tyre system, that allows the vehicle to continue rolling even with the completely deflated wheels.

In use with the Spanish Army since 2007, this type of vehicle was intended to replace the old BMR. They were deployed for the first time in combat zones in 2008 in operations in the northeast region of Afghanistan. The one that we will see presents a considerable build-up of mud due to its deployment in open areas, without paved roads during the wet and cold winter months.

The vehicle requires some home improvement in addition to some resin and photo-etched metal parts that are included in the kit.

1

After assessing the finish of the vehicle and what can be seen through the windows, we will only paint the bare essential items within the interior.

2



As in the previous example, the painting process is summarised in this sequence beginning with the application of a layer of primer, a must if we use pieces of diverse origin and materials, such as resin or photo-etched parts.

After that we will apply the base colour, in this case a uniform layer of slightly rectified RC105 Spanish Green. Prior to the placement of the decals, we must varnish in gloss and sealing the decals with satin or matt varnish.

Brush paint the details with acrylics and the lights with transparent lacquers over a white base to make them stand out, The model is ready for the mud work.

Depending on the characteristics of each model, we can plan our work more comfortably if we can divide it in steps. The design of this model allows us to work separately on the lower and upper part. With the idea of playing with an extremely muddy look, we can reproduce the texture with the new AK8014 Terrains Concrete, AK8030 Stirred Earth and AK8031 Accumulated Dust products, mixed in different proportions and applied by brush.

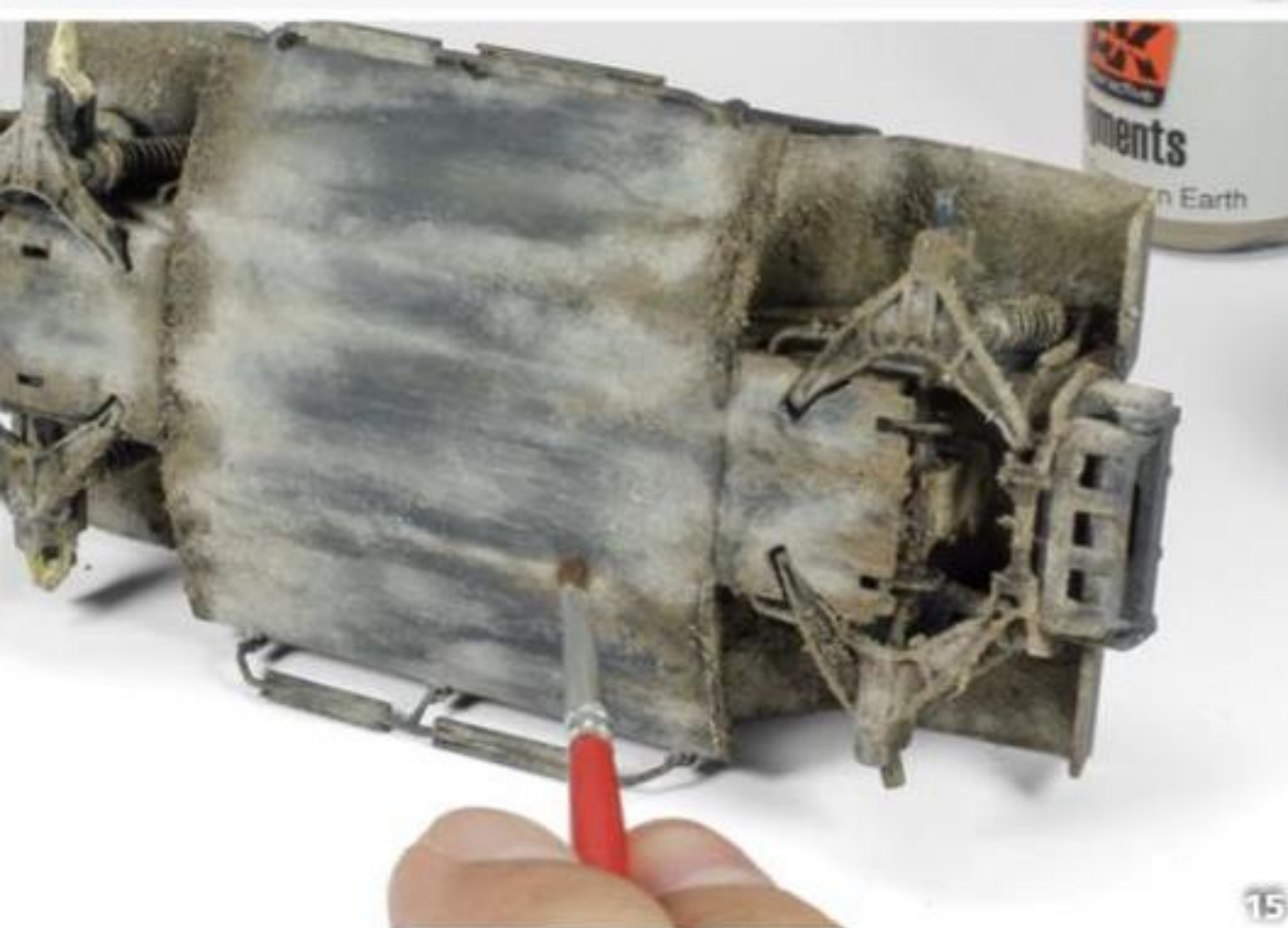




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(13). To increase the chromatic richness of the mud we will add small quantities of AK080 with an earthy-yellowish appearance.

(14). Once dry we will also blend a dark tone like AK2071 adding depth to the mud.

(15). The dry mud is done with AK040 Light Dust and AK042 European Earth pigments mixed 50%. We will apply them in the edges of the thick mud.

(16). Varying the previous ratio, making it lighter and adding a little bit of White Spirit, we'll splash the surface with the help of a brush and a toothpick.

(17). Use AK079 pigment to touch up those areas that have been over-coated by the light pigment to obtain a darker transition area and represent the fresh mud.

(18). Finally, to recreate the effect of oil and grease, apply AK084 Engine Oil on the underside and in mobile areas.



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Next we can see the complete sequence of painting and weathering of the wheels following the same process used on the chassis. This is the key when painting separate elements to get a good overall look and without discrepancies.



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(30). We will start working on the body with a selective light pre-dust effect airbrushing RC014 Buff mixed with 50% RC029 Earth Red.

(31). Next we will apply a dark wash with AK077 over all the crevices and recesses, removing with White Spirit.

(32, 33). In this example we will use the oils to highlight the surface applying a light green colour on the edges and points of maximum light. In the palette we will include dark, medium and light earthy tones to obtain the maximum contrast.

(34,35,36). The dusting phase begins with the application of AK074 applying lines on vertical areas and spots over the horizontal ones, blending them later with a brush moistened in White Spirit. To increase the dust in the horizontal areas, we will add again AK042 and AK040 dry pigments.



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(37,38,39,40,41). To achieve a muddy look we can apply AK017 Dark Brown in small amounts on the lower areas, without completely covering the light dust previously applied. We will apply splashes of wet mud with a thick mixture of AK081 Dark Earth, AK042 European Earth pigments combined with AK023 Dark Mud and AK080 Kursk Earth enamels. We will remove the stains that aren't desired with White Spirit. This phase is finished by reinforcing the intensity of the wet mud at key points with AK017 mixed with AK078, with a satin finish.



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(42). The matt black base of the exhaust received a rusty wash with AK013. Then we will blend small amounts of AK4112 Medium Rust Deposits that have a higher load than the previous enamel. The exhaust protectors are dusted with AK4063 Brown Earth Deposits and finally we will apply some soils of oil and soot.

(43,44). The body is almost finished so with a rubber tip brush and AK086 metallic pigment we will reproduce the bare metal due to the rubbing on the footrests and machine gun. After adding some details like tarpaulins and other accessories, a small vignette has been made to locate the vehicle. To note that we modified the suspension of the vehicle (see PII Techniques - C1 Assembly: Modified suspensions) to justify the small mishap suffered by it when skidding by unknown reasons and stay in the position that you can see.



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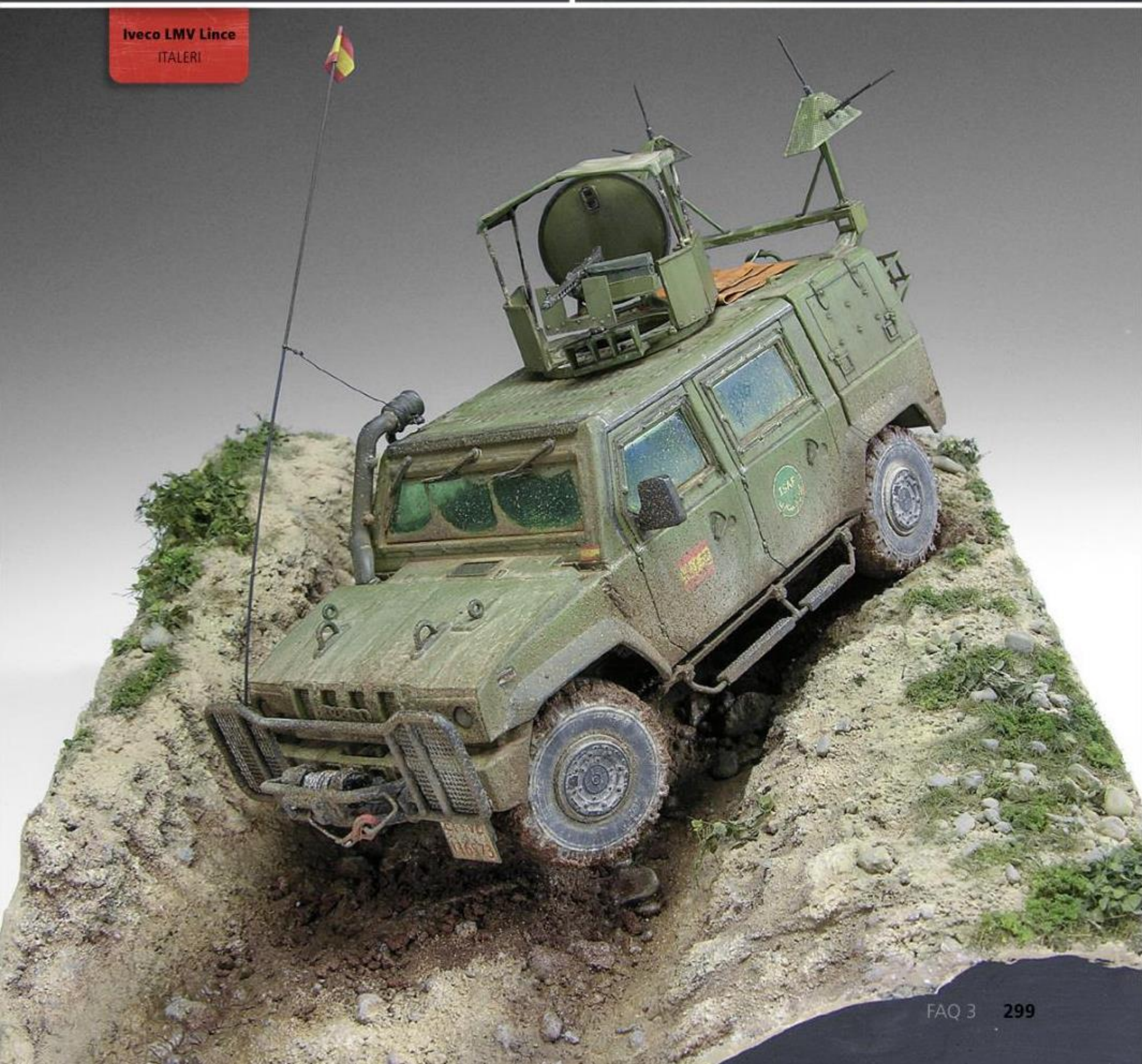


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Iveco LMV Lince
ITALERI



III. WEATHERING OF VEHICLES



CHAP.: 2

Medium size vehicles

This chapter will be dedicated to the techniques that were seen on the main part of the book, focusing on light and medium size vehicles, both armored and unprotected.

To avoid mistakes, it must be considered that the work increases, and the results are much more visible, so we have to learn and control the techniques used.



III.2.1.

M1078 CARGO TRUCK

The tactical medium vehicles family (FMTV) is a range of modern trucks developed by LMTV 4X4 2.5ton and MTV 6X6 5ton military vehicles based on a common chassis. They were acquired with the intention to replace the old medium-sized USA army trucks by a modern and more efficient design. FMTV'S are based in the Austrian truck Steyr 12M18 deeply modified.

The LMTV is based on the standard M1078 cargo truck initially designed for the transport of cargo and troops, as well the cargo box can be equipped with a set of seats. It also has a set of frames and removable canvas. Usually they are not armed but can be mounted a

M2HB 50mm machine gun, a 40mm grenade launcher and a 5.56mm or 7.62mm machine guns for an artillery position in the center of the cabin.

Since introduction in 1991, more than 95,000 units have been deployed and in active service with a multitude of configurations and battle fronts. The one that we will show could be set in any place in North America or Europe and it is wearing a typical NATO camouflage. It has been presented in a small vignette over an asphalt road with a fine layer of mud and dry earth, after driving through an area with dirt and puddles.



(1). The assembly of the kit is straightforwardly the box. Maybe the most complicated area is the manufacturing of the cage frame and its brackets. We can use a hollow metal rod cut into size.

(2,3,4). Then, with the help of a cardboard mold, we will bend the wire, adding the arches and crossbars. Once soldered, we need to apply a very resistant primer as the ak 758, with one layer is enough.





(5,6). After application of the camo pattern, some accessories such as headlights and other details are painted (see PII. Techniques - C3. Bases: camouflaged and identification marks), we will apply some subtle pin washes using a mix of Abt.007 Raw Umber oil and dark enamel AK075 diluted with White Spirit.

(7,8). In some areas, we will have to be less subtle to get some shading. After applied wait a couple of minutes and begin to blend the wash with a large brush moistened in White Spirit.

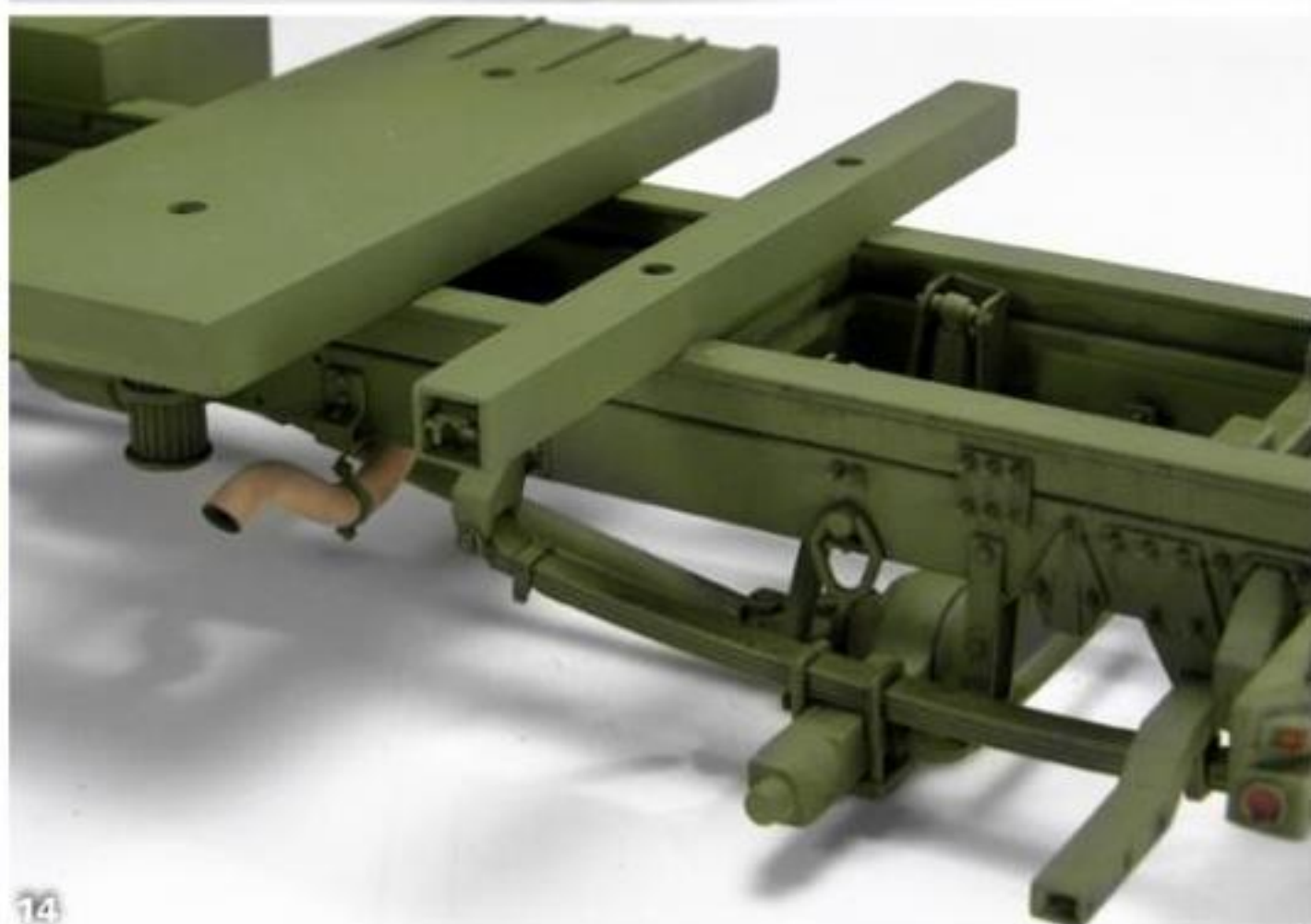
(9,10). In this same phase and using the same wash we can improvise some other effect. In this case we apply a light splash on the horizontal area of the cargo area to simulate dirt.



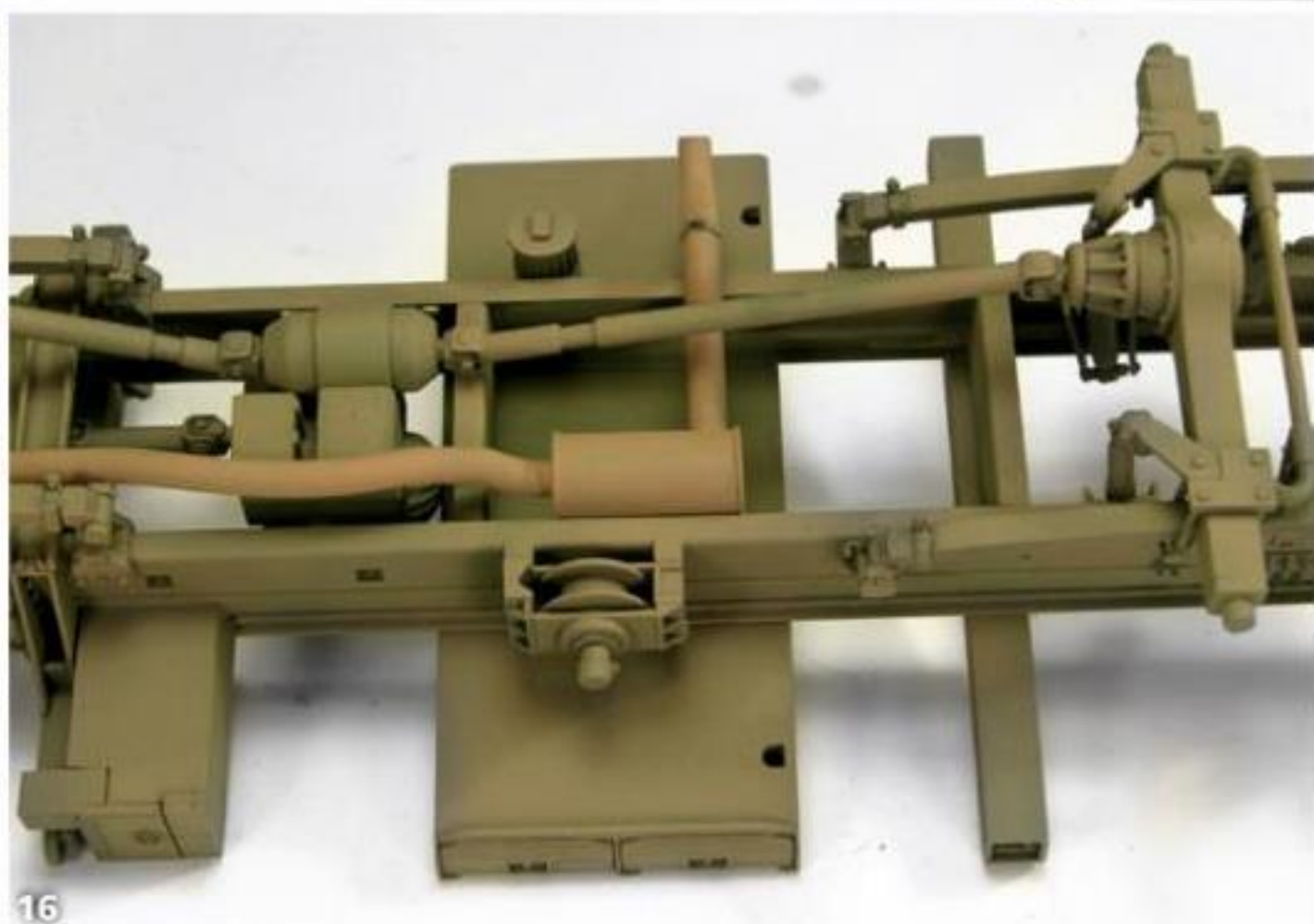
11 12



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(11,12,13,14). The result must be clean and after its application we will observe how the model gains in depth. On the chassis will also add effects such as streaking grime.

(15,16,17). We will continue with the pre-dusting phase to provide the model with a matt base needed to fix correctly the subsequent mud effects. Just airbrush a combination of browns in the lower area of the chassis until you got the desired effect and color.



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(18,19,20,21). This same pre-dusting effect is applied to the rest of the areas of the model using the same technique.



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(22,23,24,25). We will continue with the dust effects phase, increasing the process to obtain a certain texture. We will apply a mix of AK013, 074 and 4061 enamels trying to obtain a slightly lighter color than the one used in the pre-dusting step but in the same tone range. We will airbrush this mixture at very low pressure, thereby obtaining a splash with a certain grain. We will try to cover part of the previous work, always accumulating more in the lower areas of the vehicle and less in the upper areas.



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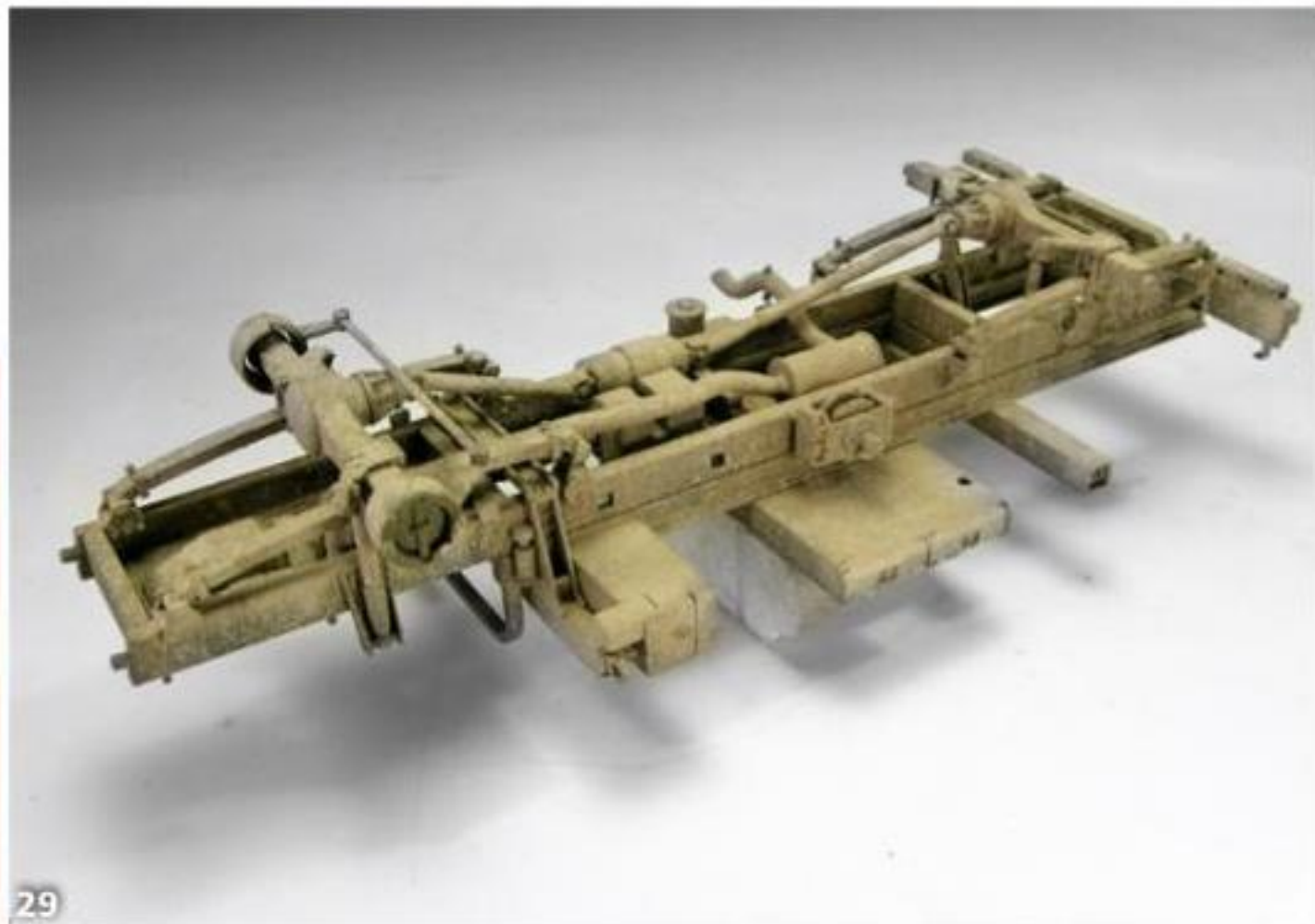


The final process is to blend the surface with a brush moistened in White Spirit trying to eliminate larger spots and blending some areas to get tonal variety and richness in the application of this light mud effect.

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(27,28,29,30,31). We will take one step forward improving the mud effect, more extreme doing it but at the same time reducing the area of application. To obtain an extra texture, we will add plaster to the previous mix. The result obtained is more realistic by enriching the mud effect. We will change the application method using a hard bristle brush and a toothpick to add splashes much thicker than the previous ones.

(32). The mud effect is finished accumulating more mud and texture. We will use the new textures for dioramas. AK8031 is ideal for this color. Its formulation allows us to apply it quickly and easily.



32



(33,34,35). The whole process of muddy most interesting detail is to add some humidity. We must use a dark and wet mix combining AK078, 016 enamels, a bit of plaster and some gloss varnish or AK079. This mix is applied as seen but in a very controlled way and in very specific areas of the lower hull.



33 34
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(37,38,39). We continue the weathering process applying various wet effects and streaking grime. We will use a combination of Abt oil paintings. 007 Raw Umber and 002 Sepia combined with AK079 applied with brush and partially blended with White Spirit.

In a second step we add some grease and oil effects mixing AK084 with AK079, selecting some parts of the chassis and the transmission. We will also combine Abt.160 oil with the varnish to reproduce the effect of fuel spilled. We will have to saturate these parts to get some brightness as the matt texture obtained with the mud effect absorbs the oil and does not let it shine enough.



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(41,42,43,44). In this sequence, you can see the results obtained on the chassis.



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In this page, we can see the complete steps of the wheels painting and weathering. The original rubber wheels have been replaced by an excellent DEF Models resin set.





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(58,59,60,61). The final look of the finished chassis is more realistic. The advantage of the trucks is that they allow us to work comfortably in sub-assemblies, the chassis, the bodywork and the cargo area.

(62). Then we keep working on the cabin, after the pre-dusting effect, we will place the windows using white glue and simulating the wipers traces with tape. We airbrush some matt varnish to mark and simulate the dust.

(63). Usually the work on the cabin must be very subtle and it is quite high. We will start adding rainmarks with light oils such as Abt.035 Buff and 093 Earth.

(64). Abt P417, P415 and P037 pigments are applied dry to the roof and some nooks and crannies, where dust is accumulated.



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(65,66). The front grille and the cargo grill receive a similar effect. Inside the cargo area we will apply some dust and dirt effects with oils taking into account that most of these effects will remain covered with the load.

(67,68,69,70). On the front bumper and lower part of the cabin the same extreme process is already carried out, helping to integrate them completely.



(71,72). Once the chassis, the wheels, the cabin and the bumper are finished, we can glue them together and we check how the model's aspect is progressing.

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(73,74,75,76). Then, we assemble the spare wheel, the cargo area and finally the cage and the accessories if we decide to add them.





LMTV M1078
TRUMPETER



III.2.2.

KRAZ-255B OFF-ROAD TRUCK

This powerful truck was manufactured by Kremenchutskyi Avtomobilnyi Zavod in 1965 although mass production did not start until 1967. It replaced the previous KrAZ-214 7ton version and it had a new hydraulic braking system, a more powerful 240hp V8 diesel engine and some larger wheels with an adjustable pressure system according to the land needs and controlled by the driver.

It was widely used by all the countries of the Soviet Union and still is in service in numerous countries. There are many versions and configurations representing an excellent multipurpose platform. We must add that most extreme irregular forces and militias made the most extreme conversions showing radical features in their vehicles.

One of that represent a captured cargo version by the Croatian army in the Bosnian conflict with a typical three tone camo covered with dust and dirt layer.



The model is built OOTB, offering a medium weight vehicle but with an important size. As in any model with these characteristics, It is convenient to make sub-assemblies to facilitate the painting work such as the cabin, chassis and cargo area.



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Here we shown the painting process of the base and the placement of identification marks of the model. After applying the green base camouflage tone we decided to apply a layer of chipping fluid to reproduce the chips under the other colors, in this case a yellow sand and a dark brown.



(9,10). The chips are reproduced in 2 phases, the first by using AK4134 Green Khaki like the base and the second by the using red oxide from Life Color range.

(11,12,13). On the chassis some chipping and rubbing with light green are reproduced using a brush and then rust with red and a sponge. Usually, this later should be retouched with a brush.

(14,15,16,17). We will apply in a first phase the sponge with the red oxide trying to focus on the areas of the maximum friction. Then we continue with the same color but with a brush to improve the sponge effect. Trying to made contrasts, we will apply over the rest of the camouflage colors more light green chips. This phase is finished.



Complete sequence of painting and weathering the wheels. The methods applied, and the result should guide us to achieve a balanced result in the rest of the model.





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(34,35,36). The weathering phase will start with oils by applying Abt oxide tones. 006 Burnt Umber and 020 Faded Dark Yellow on the horizontal zones of the chassis blending them with White Spirit.



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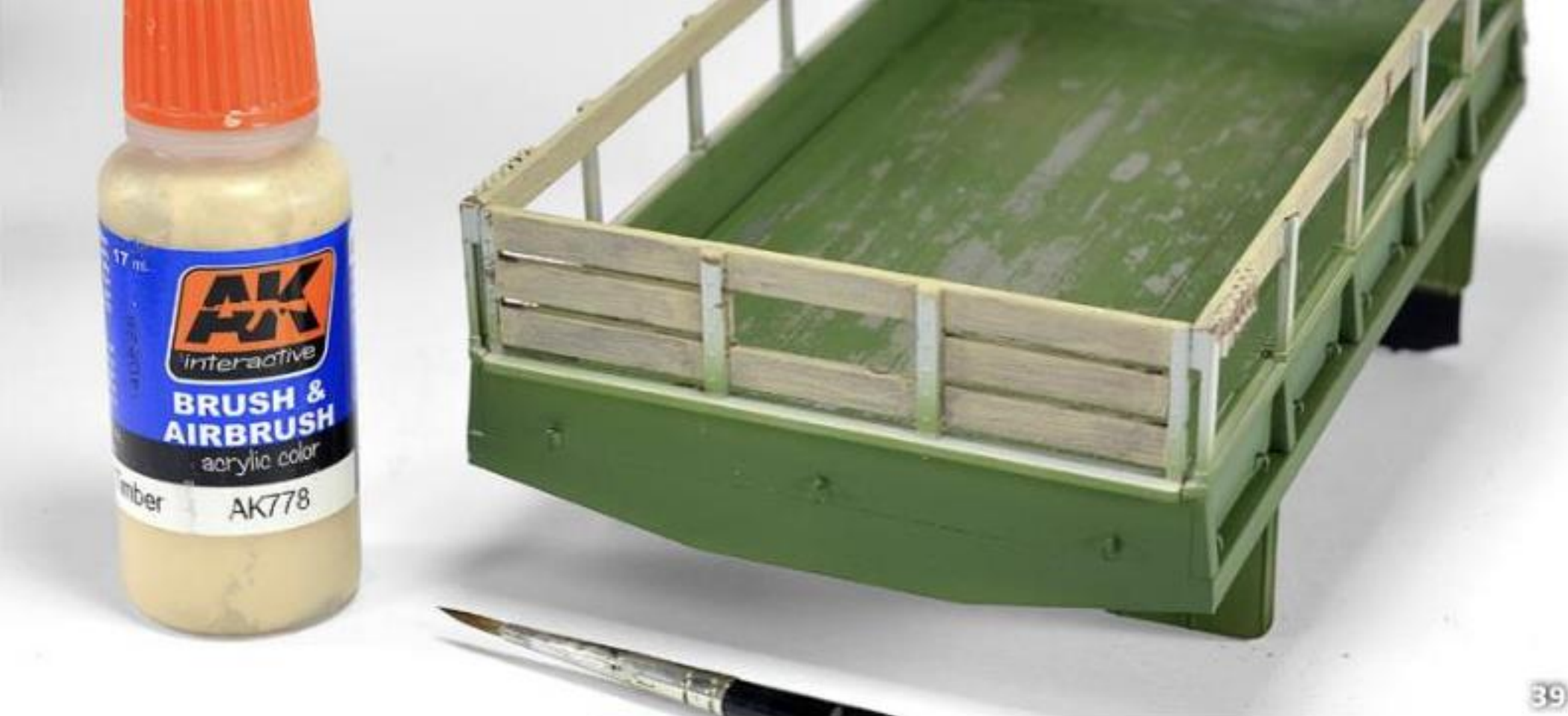
(37,38). We will continue with Bitume oil or Engine Grease reproducing the leaks fuel over the deposits. This work is completed with the application of reddish or dark pigments over the same area.



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(39,40,41,42).

The work on the cargo area is divided in two parts. First, we will deal with the wood, and then the metal. We will start applying an acrylic AK778 light beige on the wood. Then we will apply a dark brown wash with AK263 that we will combine with orange filters using AK261 on some slats. Finally, after applying AK088 chipping fluid, we will airbrush the green base removing the excess with water.



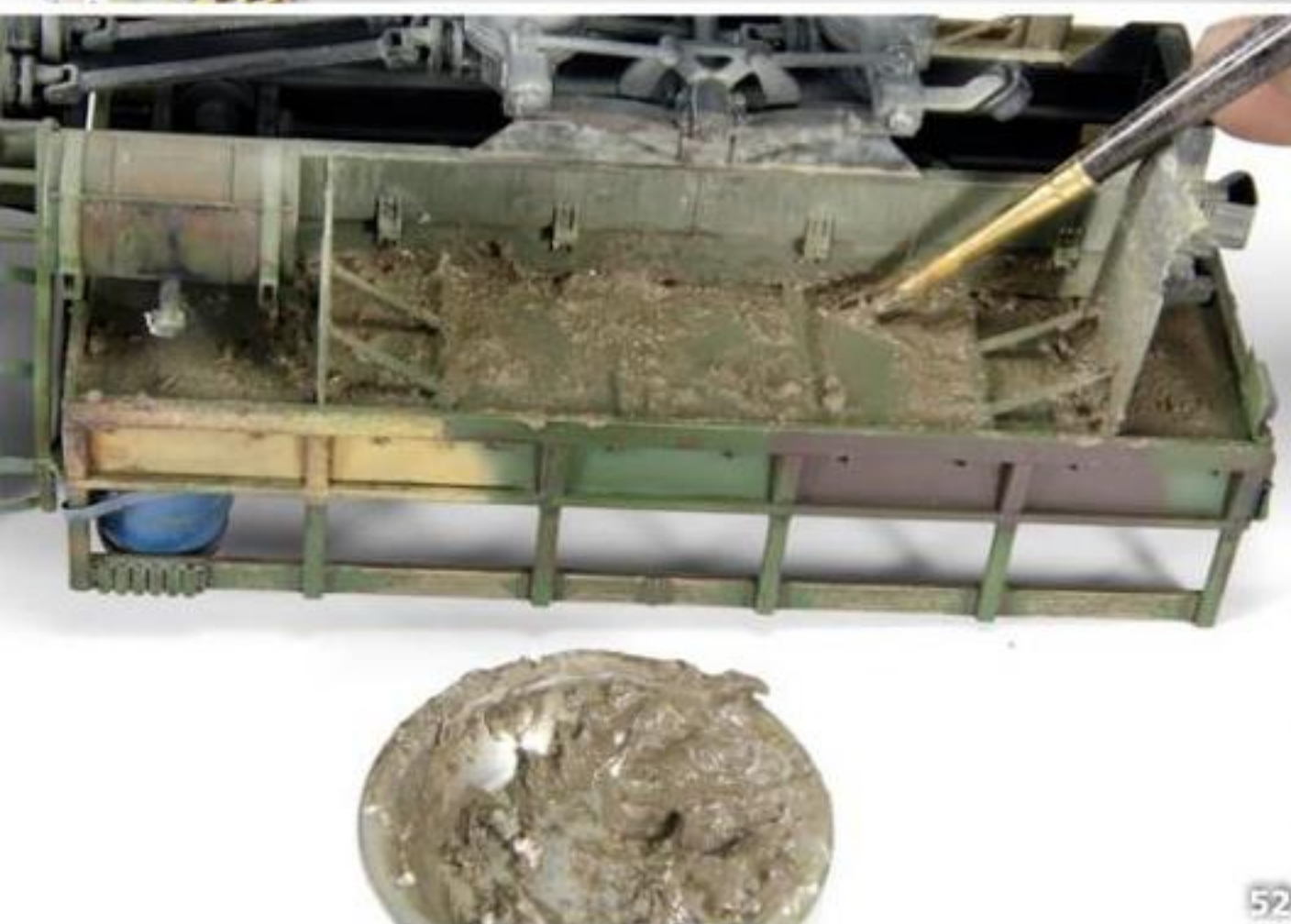
(43,44,45,46,47,48,49). The metal part of the cargo area is also painted in the same way already explained on the previous example, first applying a layer of Xtreme Metal aluminium and then the green base tone after the chipping fluid coat (See PII Techniques-C3 Bases: chipping fluids). Once the base paint is completed we will apply pin-washes with Abt.007 Raw Umber oil with an earthy finish. We will continue applying a mix of dry pigments AK081 Dark earth, 041 NA Dust and 140 Sienna Soil emphasizing corners and nooks. Finally, we'll end up reproducing some wet effects like stains and splashes of oil and grease. The external sides are weathered with an oil palette containing brown and rusty tones trying to reproduce some rust effects and grease, applying the oil directly over such area and blending with White Spirit.



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(50,51). Once the structural elements had been painted separately, we will assemble them to integrate them and finish the work together. We will start airbrushing at the bottom a layer of AK4062 that we will later remove with White Spirit. Sweeping the surface to remove a part of the enamel.

(52,53). Next to simulate dry mud and dirt we will apply a mix of the same previous enamel adding plaster and AK143 Burnt Umber pigment, that we will deposit with a brush. Before it dries, we will peck with a sponge to increase the texture.



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To add contrast and chromatic tones, we will splash on the less accessible zones a mixture of the same pigment and enamel AK016 Fresh Mud.



(55,56,57). We will repeat this process on the back area of the box where the wheels project the dirt when running.

(58,59). In the engine access will reproduce all type of grease and oil stains with sepia oil with a very dark look.

(60,61,62). The layer of dust on the windshield is reproduced airbrushing any light enamel tone after placing the masks. Then we can add dirt to the hood with AK675 greenish gray enamel with a heavy load of pigment and paint. After applying it, we will remove the excess with White Spirit applying pigments in a timely manner in the access areas of the vehicle.





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(63,64). The final aspect after effects accumulation give a realistic image of the model.





KRAZ-255B
HOBBY BOSS



III.2.3. BMR-VCZ

In 1972, the Spanish Army request the tactical and technical development of an armored wheeled vehicle for transport and movement of troops duties. Designed by ENASA, the Pegaso BMR600 prototype was evaluated during four years and start into production in 1979, developing personal carrier, 81 and 120mm mortar holders, recovery, repair and ambulance versions. The Army has developed a transmissions version for engineering corp.

The BMRs have been deployed to several international missions such as peace keepers in the former Yugoslavia, under the ISAF in the last two years in Afghanistan, different operations in Iraq after the

Saddam's regime fall, and others in Lebanon. Also, some units exported to Saudi Arabia and Egypt were employed effectively during the 1992 Kuwait campaign.

The model presented is a BMR VCZ (Vehículo de Combate de Zapadores) / (Pioneers Combat Vehicle) equipped with a shovel in the front and a powerful winch. Located in the Bosnian conflict, the vehicle portraying the unmistakable white camouflage and identifying marks which indicate that it operates under the UN command. The vehicle evolves on a humid and muddy ground producing a strong contrast with its color.



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In full development during the preparation of this book, this vehicle is completely made in resin. The assembly of this type of models requires much more work and skills, compared to plastic models. The addition of some aftermarket and scratch pieces to improve the kit is a must do. However, these kits are usually unseen pieces and, sometimes, very eye-catching and expected by the fans.



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(1,2,3,4,5,6,7,8,9,10). In this sequence you can see the painting process of the basecoat and the placement of the identification marks of the model. In this type of model including pieces of different materials, the primer is mandatory. After applying the green tone, we decided to apply a layer of chipping fluid that will allow to perform all kind of weathering and chipping over the white camouflage. The use of wet decals requires a varnish before its placement.

(11,12). To break the monotony and to soften the intense white color, we apply a filter. We will apply a grayish tone AK4161 in a soft and controlled way. After a few minutes we will soften the surface, eliminating part of the filter or reproducing other types of effects, sweeping with a flat brush moistened in White Spirit.



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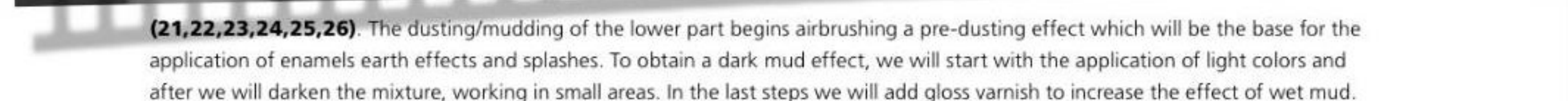
(13,14). Also, a wash will be a basic effect to add a slight contrast. We will use Abt.015 Dark brown oil diluted and applied with a brush along cracks and reliefs, removing the excess with a clean brush and diluent.

(15). Despite the chipping made during the painting phase with the chipping fluid, we will need to incorporate a second effect to provide depth and contrast. We will use dark brown and rust acrylics highlighting the parts and pieces with greater weathering. If you look closely, the key always is to get the right contrast during all phases of the weathering process, it is useless to apply the techniques if they leave no trace or if is too soft that is almost imperceptible.

(16,17). During the rusting step and with a lot of care, we will use a range of Abt.060 Light Rust, 070 Dark Rust and 006 Burnt Umber oils, applied as a streaking line and blended with diluent.



(18,19,20). The work is divided in two during the dusting phase, the one done on the upper and the other applied on the lower hull of the vehicle. We will start this time by applying earthy tones like Abt.092 Ocher and 093 Earth in the upper part mixed with 035 Buff and 090 Industrial Earth applied in the nooks and crannies. After the oil paintings we will complement the work with the application of pigments in very localized areas as a base for the different further wet effects.



(21,22,23,24,25,26). The dusting/mudding of the lower part begins airbrushing a pre-dusting effect which will be the base for the application of enamels earth effects and splashes. To obtain a dark mud effect, we will start with the application of light colors and after we will darken the mixture, working in small areas. In the last steps we will add gloss varnish to increase the effect of wet mud.



Part of the final look is fuel leaks achieved combining oil grease with some gloss varnish or even AK025 Fuel Stains that we will apply as a streaking grime, blending all together.



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(28,29,30,31,32,33,34,35,36). Complete painting sequence and weathering of the wheels. Enamels have been used for ground effects together with some plaster. This step is decisive and will allow us to obtain the humid and muddy terrain representation.



III.2.4. M113 ACAV

Developed from M59 and M75 chassis in the late 1950's, the M113 family has approximately a dozen of versions with more than 80,000 units built at the date. This vehicle has a great amphibious capability although their navigability is quite relative and limited. So, this capacity is only used to wade rivers.

Due to the reduced weight, it has greater mobility and maneuverability over irregular terrain, ideal for the combat in hard conditions. Its hull is manufactured in aluminum and its main purpose is as a personnel armored carrier.

The first appearance in combat was during the Vietnam War. The showed model is the armored cavalry version ACAV with its characteristic circular shield around the 12.7mm machine gun mounted on the commander's cupola and its two 7.62mm machine guns in both sides on the troop compartment also equipped with front shields. It will be shown packed-up with stowage and with a medium texture and orange colored mud effect according to the environment that we are used seeing in multitude of references and photographs of the Time magazine.



(1,2). The kit is built OOTB straightforward with just some details taken into account. Extra accessories are added later to be able to locate it correctly. Among them we include some resin stowage and PE parts such as the shields of machine guns, headlight protectors, etc. Some rivets were added, the tracks replaced for a white metal set adding a lot of realism once the model is finished.

(3). The manufacturing in aluminum of this vehicle will guide us at the time of beginning with the process of the base painting. We will apply a layer of aluminum color to the entire hull using the airbrush.

(4). Continuing the process, we will apply a layer of AK088 chipping fluid also with the airbrush to achieve a smooth finish. The basecoat of this vehicle is a dark green shade painted with uniform color single characteristic.





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(5). The purpose applying the initial layer of aluminium under the green tone is to obtain a nice chipping effect in a more comfortable way and with better results. After using Worn Effects and letting dry the green, we will moisten the paint with water and using different brushes and pointed tools, we can get the surface chipped in a punctual, fast and realistic way.

(6). Many of these vehicles seen in combat carried all kinds of inscriptions and varied messages. We can make our own masks or use any commercial such as transfer, decal or even pre-cut mask. Once the base is dry we will place all the identification markings, slogans and inscriptions over our vehicle to apply the weathering also over them. In the image it is observed that with a very simple mask we can reproduce subtle weathering effects over mudguard area applying slightly different green acrylic tone from the base green color.

(7). Prior to weathering it is also convenient to paint some parts and accessories to get the same effects as the vehicle such as headlights, lights, periscopes and tools. These are painted separately, can be fixed before the weathering process to integrate them perfectly.



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(8). The mud phase of the lower hull begins with the reproduction of the base texture using any specific product. Although the color is not important the grain should match our needs. This time we use Tamiya textured paint on the underside of the vehicle.

(9). Next, we will apply AK041 NA Dust and AK081 Dark Earth pigments mixed all together to achieve more chromatism and variety in the result because this paste is usually uniform.



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(10). The problem or the advantage, depending on how you look at it: if we have a good graphic reference you can't improvise and the movement margin is reduced but at the same time it helps as a guide with the colors and effects to achieve. This is precisely what happens in Vietnam because the operational ground composition is the typical ochre or orange patina on top of the vehicles and troops. To achieve this, we will use enamels with that finish like AK080 and AK066 applied as a wash.



(11,12). The dust effects on top will be done with Tamiya XF59 Desert Yellow airbrushed over a layer of AK089 chipping fluid. After airbrushing the paint over the chipping fluid, we will proceed to remove it, trying not to affect the corners but working on the rest of surfaces achieving a very realistic cumulative dust effect.

(13). On the wheels we will add AK042 pigments after the previous effect, accumulating more dust and dirt, which we will fix later with AK048 pigment fixer.

(14). Once the accessories are painted, we will begin to fix them on the vehicle unifying them later with some dust and dirt. We have very eye-catching colors as this canvas modeled with Putty, it is advised not to exaggerate this effect.

(15). Details such as footprints and footsteps are almost necessary on this type of armored vehicles from crews and troops. We can use a leftover boot of a figure or a specific silicone accessory. Apply a light coat of pigment and then press with the boot moistened.

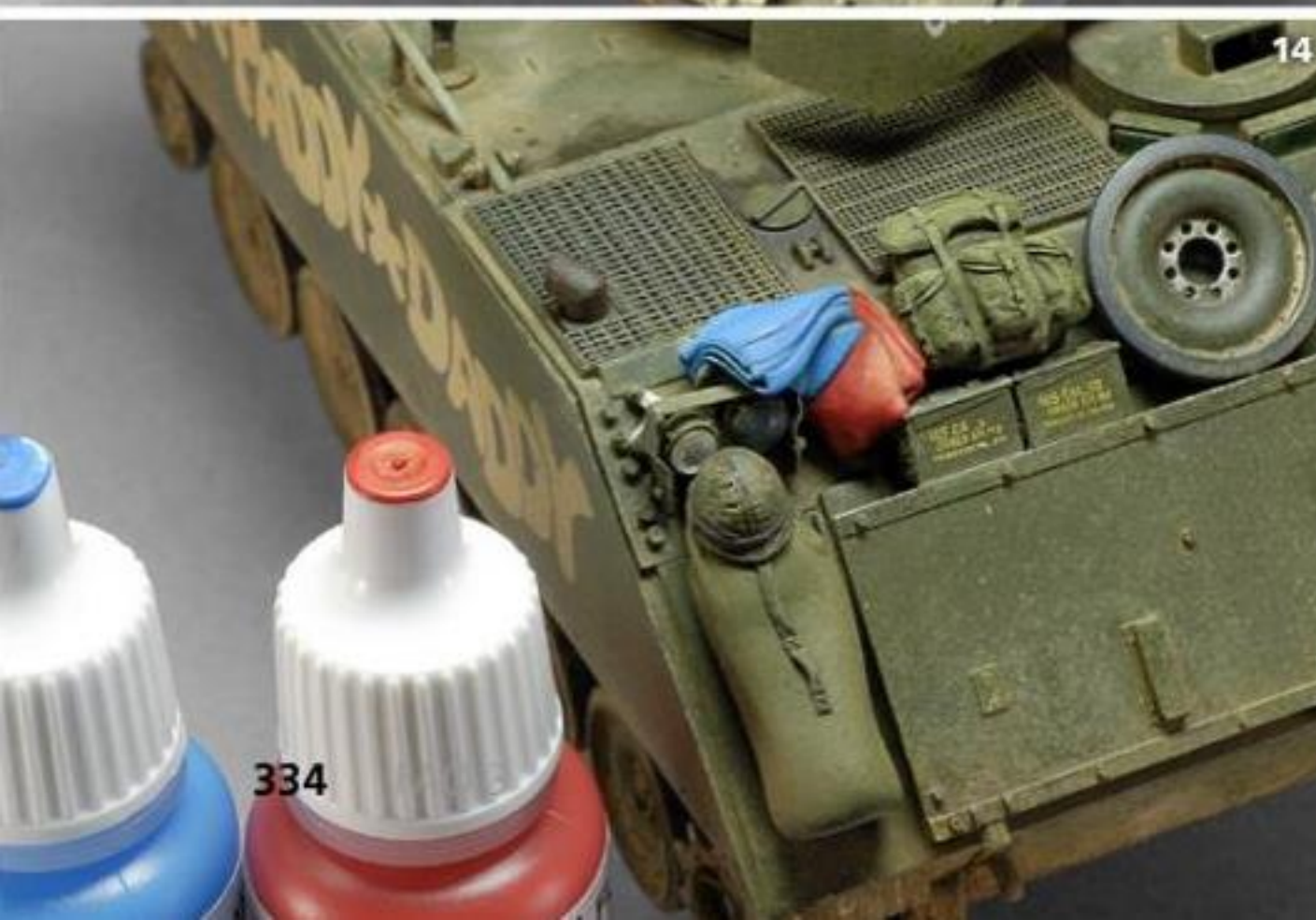


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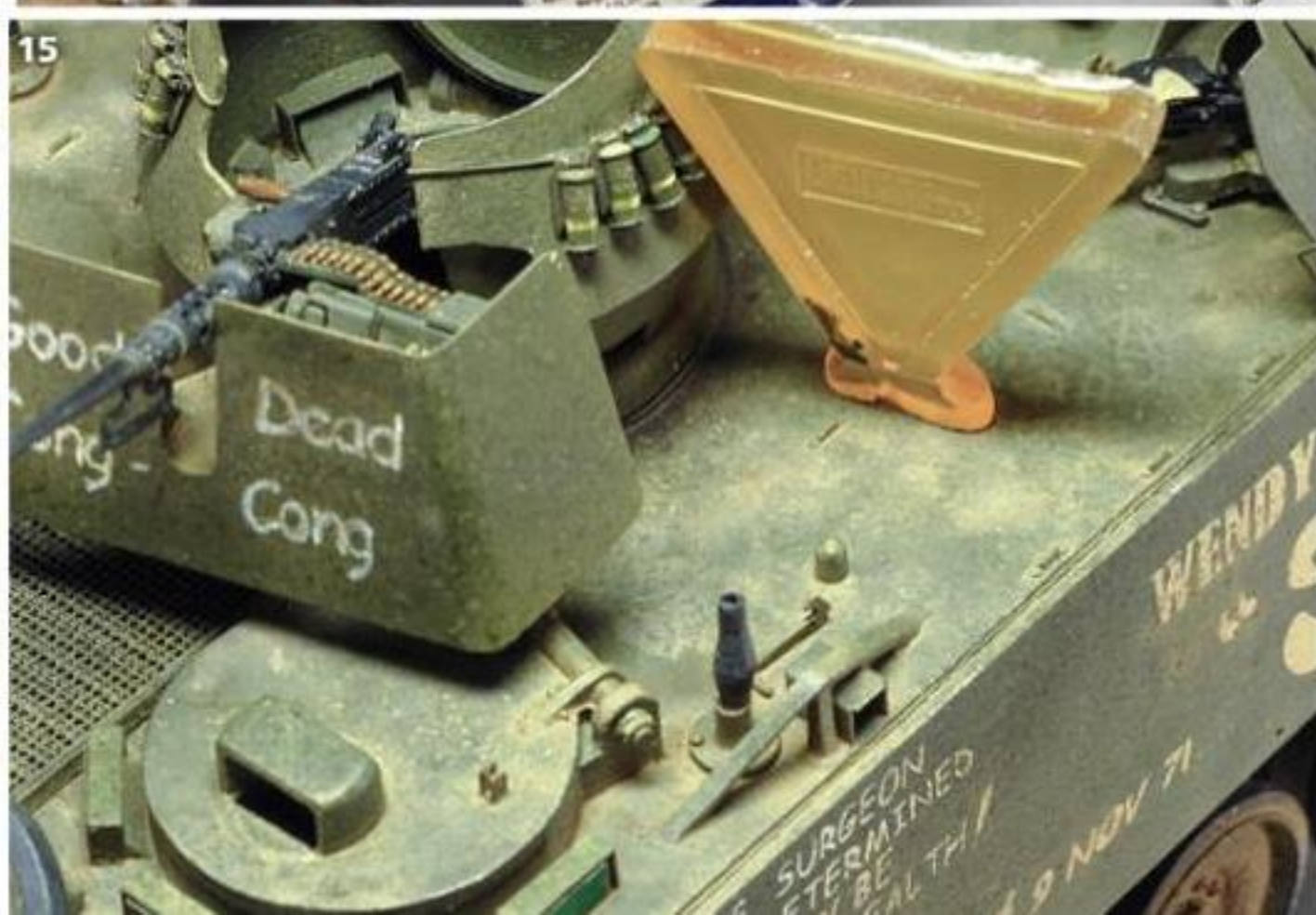
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(16,17,18). The complete painting process of the tracks is very simple and effective. After applying a layer of primer, we airbrush a dark brown acrylic, and the rubber pads are painted with black. The next step is to apply a wash with AK080 enamel and some pigments. Finally, we will apply graphite with the fingers to simulate the bare metal.

(19,20). With the incorporation of some wet effects we reach the final phase. To achieve this, we will apply some streaking effects AK079 wet fluid. Despite being transparent, its brightness will contrast with the matt finish of the surface, darkening the base color in such a way than with water or any other fluid. To represent oil and grease leaks on the hull and undercarriage, we will apply streaks of AK084 Engine Oil and we blend with White Spirit.

(21,22,23). Overall look of the vehicle with accessories and after adding some small detail. This part of the job is more tedious, but it helps to improve the final look considerably.





M113 ACAV
TAMIYA



III.2.3.

M113 DUALTEX

In the 60's, with the Vietnam War, the United States develop a new camouflage pattern called standard MERDC used until the mid-80's, when it was replaced by the current well-known NATO pattern.

At the end of the 70's they began to study disruptive patterns, based on the disintegration of the limits of an object. It was in the 80's in Germany, when the pattern called double texture gradient, a camouflage with spots in the form of different colors squares and that probably was the first true pattern of scientific camouflage used by the American Army.

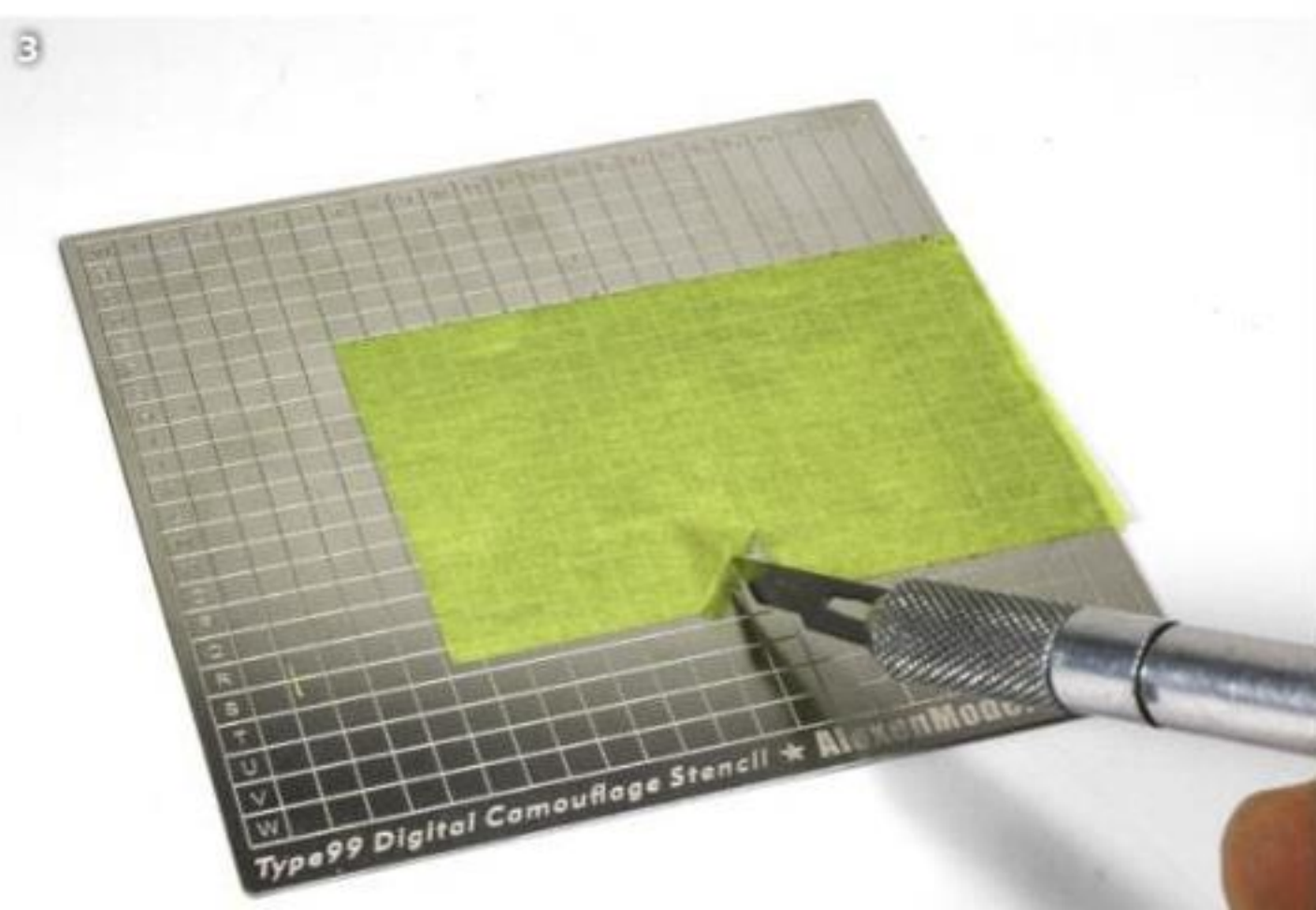
In 1976 Lieutenant Colonel Timothy R. O'Neil, modified the MERDC pattern by one Dualtex type. After a series of tests, it was proved its greatest effectiveness, and in 1979 it was adopted by the 2nd Armored Cavalry Regiment.

The model that we present below, belongs to the Australian Army that also tested this type of camouflages in some of their vehicles and helicopters. To show the Dualtex pattern vehicle that will be displayed presents a very light dusty layer because it is a test vehicle.

(1). Regarding the assembly, the same model as show in the previous example, there is nothing relevant to add except that this time we just replaced the ventilation grilles of the roof of the vehicle and the main welds of the hull.

(2). The most remarkable aspect of this vehicle is the base paint process incorporating a Dualtex camouflage type. It will be shown a step by step and in detail. The main thing will be how to make the masks with a good quality modelling masking tape, a blade and some cutting mat with various types of templates that will help us.

(3). In this special vehicle and camouflage, it is important to have a good reference when it comes to use masks. We will start by sticking the tape on the cutting mat, marking and cutting each of the spots in the form of grid according to our predefined pattern.





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(4,5,6). According to our pattern, the base color of the vehicle is an off-white color, so we will airbrush with RC013 covering all the vehicle. When the base layer is dry we will begin to place all the masks applying the first camo color, a good reference is RC029 Earth Brown. Once completely masked, we will airbrush this color covering evenly all the spots.



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(7,8). We will remove all the masks to check the result of the process and continue with the camouflage. If we find any mistake we could solve it by retouching with the brush or modifying the mask and airbrushing a new layer. All this will depend on how the mistake is.

(9). We keep working on the camouflage, painting the loose spots composed of pixels or groups of smaller size. For this we will use an engraved cutting mat cutting out the masks of various shapes and sizes.



9



Type99 Digital Camouflage Stencil ★ AlexenModel • AJ0080



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(10,11). We will apply spots of a grayish green tone using RC038 Silver Gray masking with the previous masks according to the distribution in the pictures.



(12,13). Finally, we can apply the black pixels with RC001 Flat Black, with the same type of previous masks and proper distribution so that the final appearance is similar as the one observed in the available references.



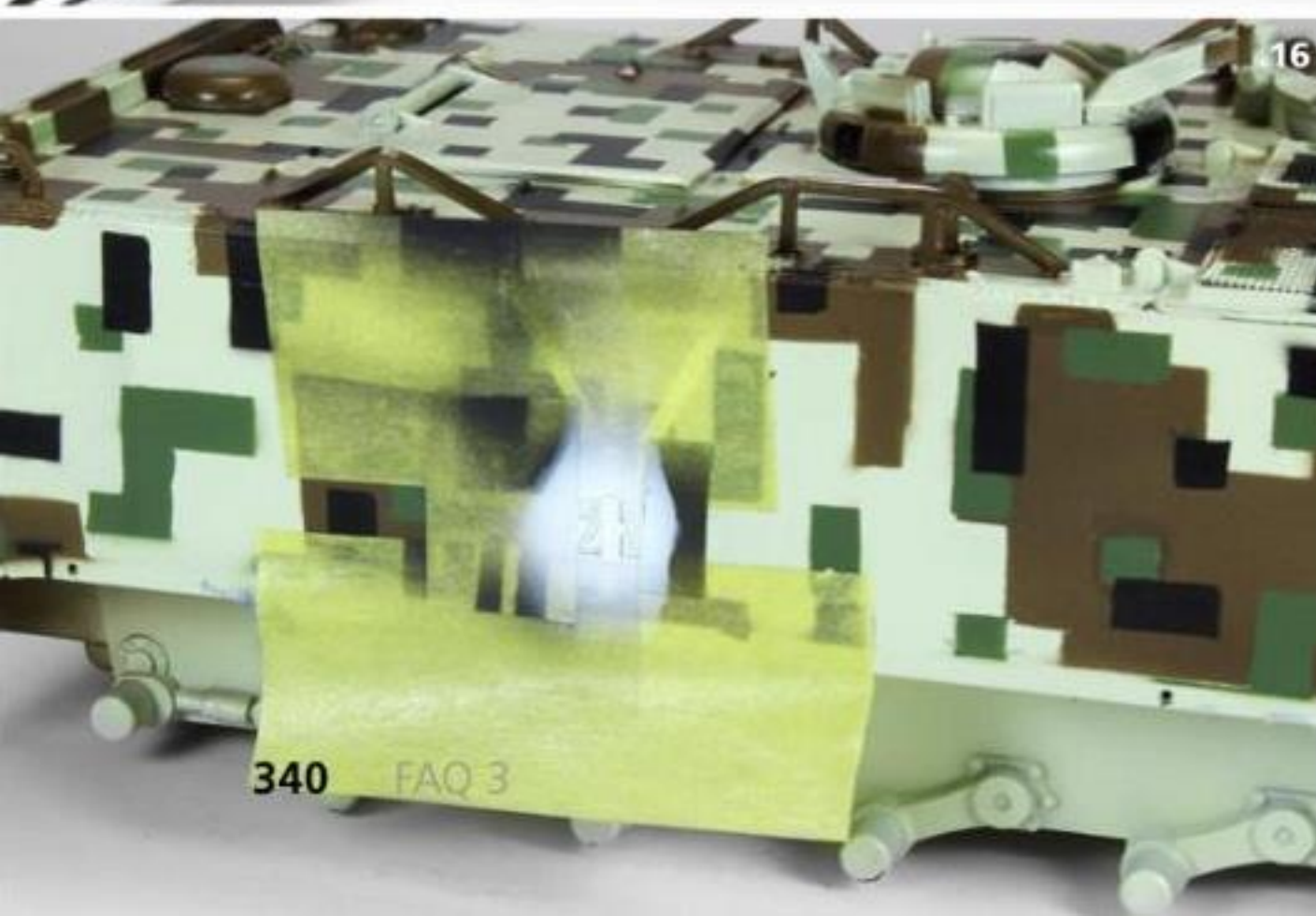
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(14,15,16,17).

After the base layer application and further camouflage, we will proceed applying the identification marks formed by a white inverted triangle and a small numeral in its lower part. The triangle is made with masking tape. The numeral is painted with the help of PE masks. After fixing them correctly, we will airbrush RC004 Flat White. Be careful not to spoil the previous paint job.



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(18,19,20). Before moving to the weathering phase, we paint some accessories such as lights and headlights. The back ones are painted with a brush in red and/or acrylic orange, depending on each model. The interior area of the frontal ones is painted in black simulating night vision lights, and white on the outside. To simulate glazing we will apply one or several drops of gloss varnish AK777, leaving to dry well before repeating its application.

(21.22). After the base painting the weathering phase start with the washes. We will apply a general wash of AK121 medium brown, and after letting it dry for a second, we will apply darker pin-wash with AK045 to differentiate and improve the contrast between some pieces. We will partially remove both washes with White Spirit.



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(23.24). Based on the vehicle operation, we will apply some chips in very specific areas, such as in the periscopes around the driver's hatch and some of the fasteners and upper handles. We will do it with a brush with a mixture of Acrylic 917 Beige and 951 White, similar to the base color. With this same mixture we will simulate flaws and scratches on the sides product of friction with various natural elements during the movement.



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Although it is not usual, at this point and after the washes, we will apply some other filters with AK261 and AK262 to modify the appearance of the upper area of the vehicle giving it a more dirty appearance than the rest, something not surprising in this type of armored vehicle, due to the use by the crew accessing and sometimes placing part of their stowage and even extra protection over it.

(26,27). After the filters and without overdo this effect, we will apply a series of dark streaks on the sides using AK014 in the form of thin lines from top to bottom. After waiting a few seconds to start drying, we will blend the color with a brush moistened in White Spirit in a vertical movement.



(28,29,30). The mud effects will be reduced to apply texture in the lower hull, both on the sides and on the front and back, insisting more on these latter areas. The roof will also receive a light dusty layer result of the movement of the crew. We will use crack filling paste adding AK042 European Earth and AK081 Dark Earth pigments to give color. We will apply the resulting paste with a thick bristles brush focusing on the edges, areas where more mud and dirt accumulate.



(31,32,33,34).

Here we can see the full painting process and the mud of the tracks. As in previous examples it consists in the application of dark brown acrylic paint for the metallic parts and black for the rubber pads. Once the base is dry, we will apply the same mixture used for the mud of the lower hull, rubbing with the brush in the direction of movement. To reproduce the polished metal produced by the friction between the tracks and the wheels, we will use AK086 metallic pigment applied with a makeup stick in the contact areas. The process is simple but effective and in line with the finish of the rest of the vehicle.



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After assembling the undercarriage and the side guards we will observe the general appearance of the vehicle checking if everything is fine and moving forward into the next phase.



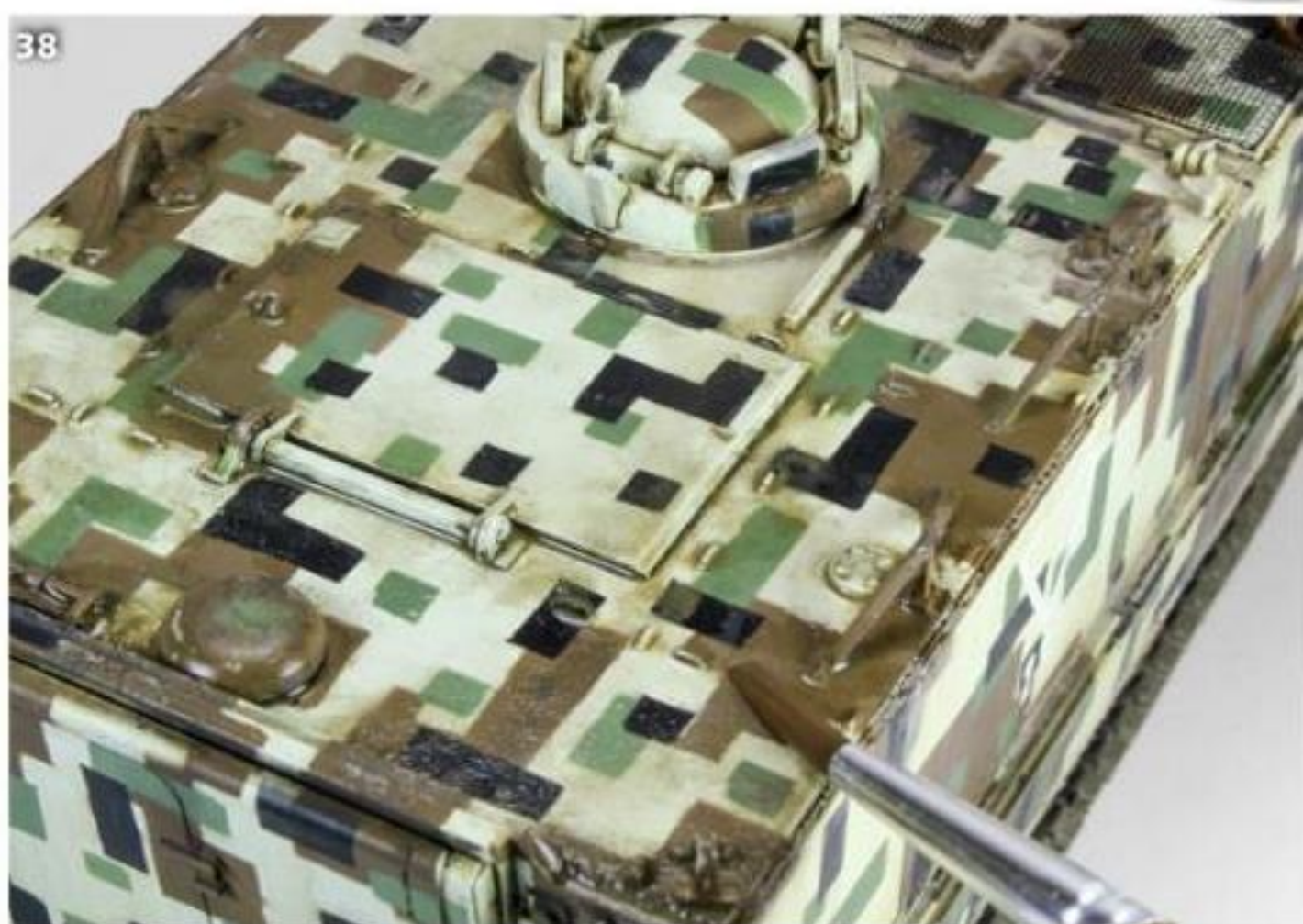
36 37



(36,37,38). So that the atmosphere is coherent, we will have to work the sides creating a transition zone between these and the running gear, as well as the roof, as cannot remain completely clean. For this we will apply washes with AK080 that we can soften with some other lighter wash. This enamel has more pigment into its composition, so its finish is completely matte adding texture.

(39,40,41). For the mud effects of the side protectors we will use the same mixture used on the tracks. We will insist especially on the front and back areas. With the same mix but more diluted we recreate splashes along all the vehicle and various stains on the roof.

(42). In this photo we observe the paint of the smoke collector, rusty and with a grease looking spots caused by the unburned fuel present in the exhaust gases. We will use acrylics in rusted tones and enamel oil to imitate grease and oil.



38



39 40



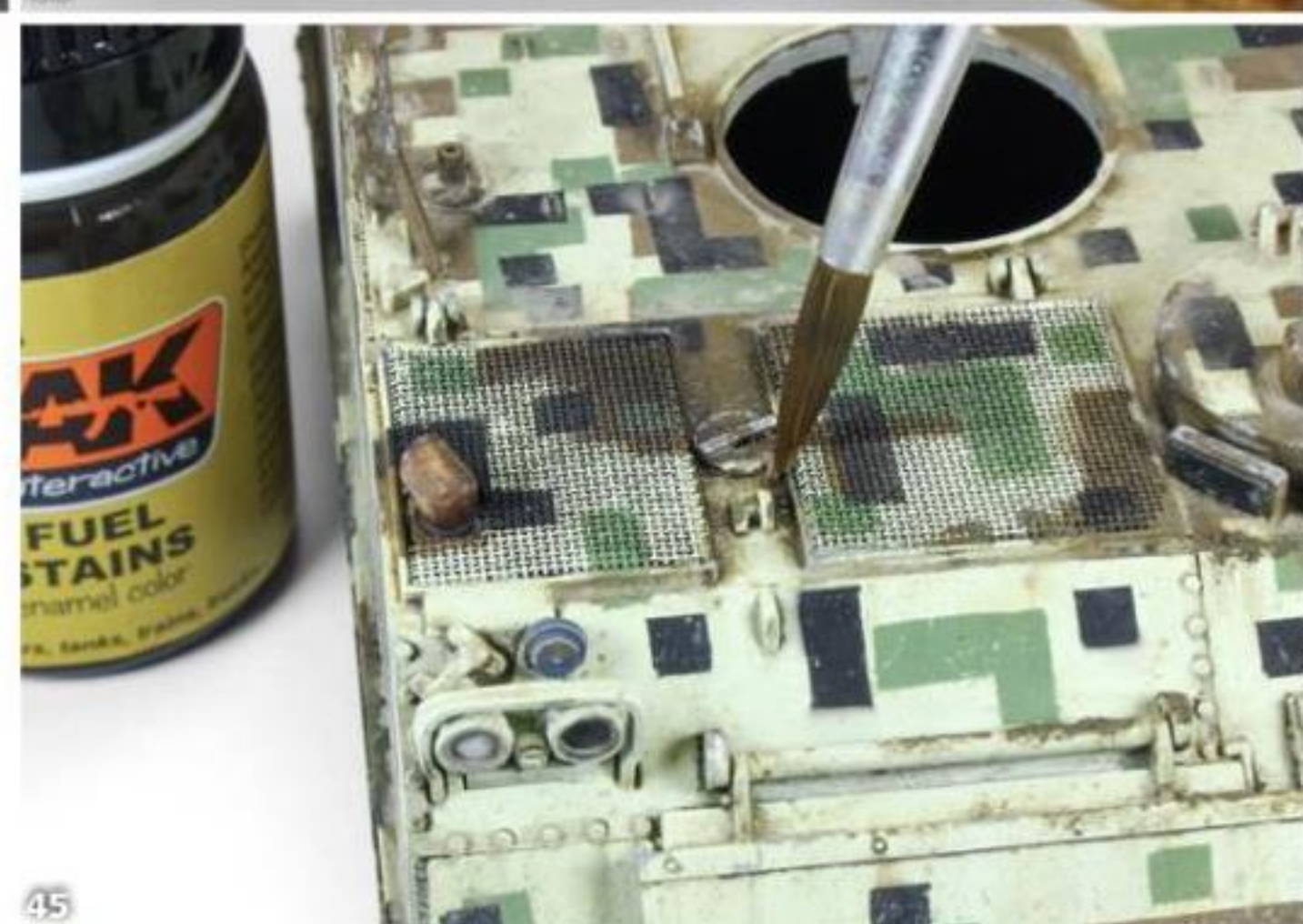
41 42



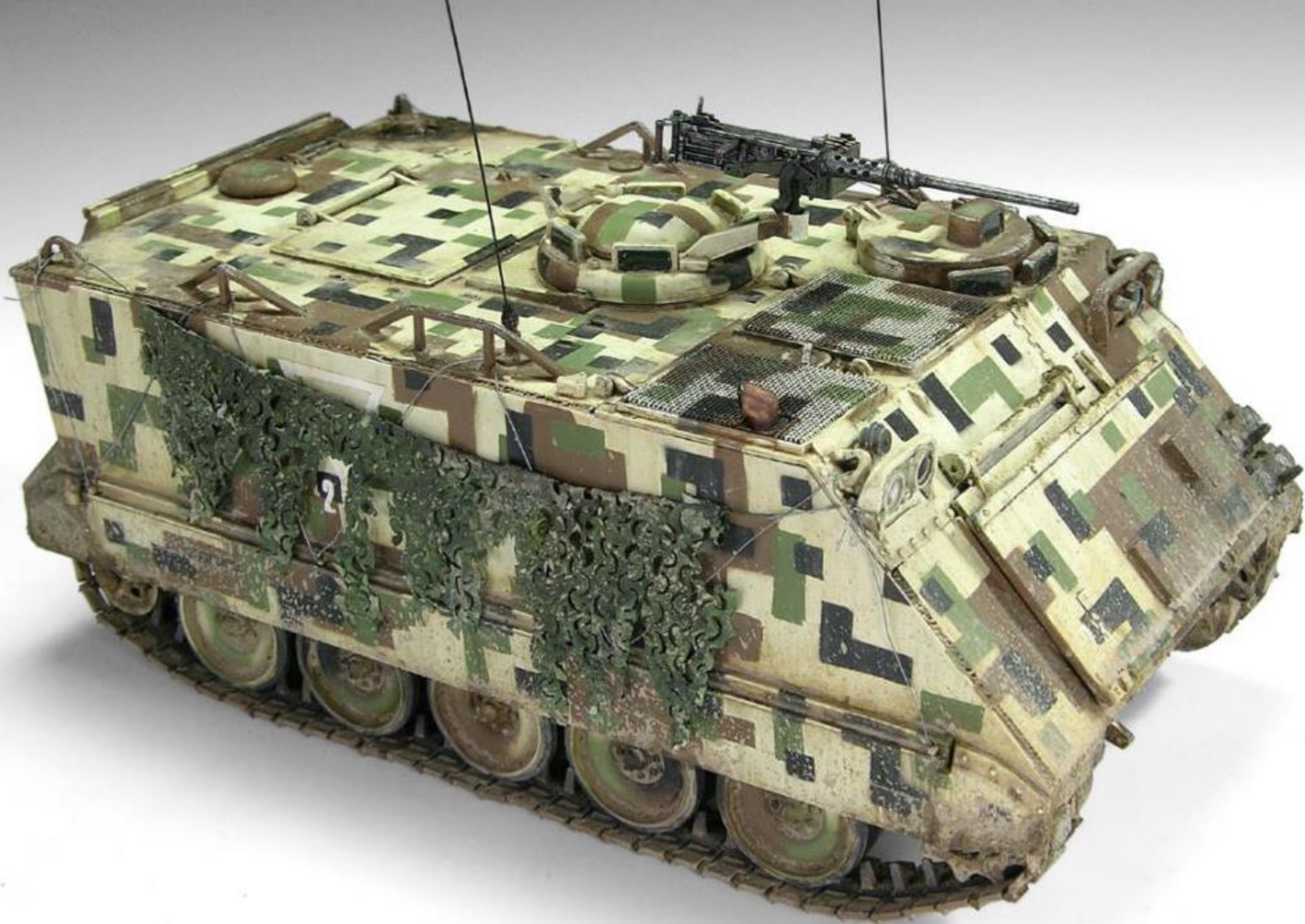


(43,44). Continuing with the mud effects improvement and to add some depth, we will use AK045 Dark Brown Wash applied as a pin-wash in nooks and crannies. We will also apply this dark tone to depict the mud still wet.

(45,46,47). In the last phase we will try to represent different wet effects such as stains and fuel spills, oil, ... After identifying the fuel intakes, we will apply AK025 enamel straight from the bottle around these areas. The effect is more real if we blend the enamel with White Spirit. To imitate the different layers and densities we will repeat the enamel application until the desired finish is achieved. The spots of other shades are simulated using enamels like AK012 (Streaking Grime) applied in the same way as the previous one, with less bright.



We have decided to place a camouflage net in one of the sides. The brackets are done with fine thin wire.





M113
AUSTRALIAN ARMY
TAMIYA



III.2.6.

M113 CHATAP

The M113 has been sold to more than 50 countries, including Israel. The Israeli Defense Forces (IDF) are one of the main users of this vehicle, known as Zeldi between its members.

The IDF has many variants, designed and developed by them. Many of them are still in service, such as the one called Chatap. This is a technical support vehicle used by the engineers who have endowed it with a multitude of boxes around the hull to store tools and spare parts for repairing and the maintenance of vehicles in combat.

It is armed with a 7.62mm machine gun although it operates in combat areas close to the troops. Today, with more than 40 years of service and obsolete protection and armour, is still very appreciated among its users given its great versatility.

The model that we show presents a layer of dust in the upper surfaces and a light and dark mud effect in the lower ones very appropriate for very arid and dry areas.

(1). Maybe the most complicated thing during the vehicle assembling is the amount of resin and PE accessories needed to convert the model into this version and on the other hand very complicated to paint.

(2,3). Once the assembly is finished we will begin the painting of the basecoat. We will use RC094 of the new Real Colors corresponding to Sinai gray that the IDF used from the 90's. We will highlight the base paint with RC014 Buff and RC004 white adding lights and volumes.

(4,5). After the initial painting phase, we will start the weathering using Abt.010 Yellow, 050 Olive Green and 025 Warm Red oils. After deposit them on a piece of cardboard to absorb part of the oil, we will apply a myriad of dots on the model with a more or less random distribution. Finally, we blend with White Spirit creating contrasts on this base painting.



Next, we will apply some washes with AK300 diluted to outline all the pieces and details. If we apply it carefully, we will avoid having to remove it excessively.



(7,8,9,10,11). The dust effects begin airbrushing a coat of AK088 Chipping Fluid straight from the bottle and covering the whole surface of the model. Once dry, we will airbrush a fine lacquer coat of RC014 Buff focusing it in the zones more likely to accumulate dust. Finally, we will remove part of the layer with a damp brush moistened in water. This work is sealed airbrushing a layer of RC500 matt varnish.



Dusting of the lower areas is done airbrushing a layer of the same color previously applied.



13

(13). The second step of the dust effects will be done using oils. We will apply Abt.003 Dust blended with White Spirit around the corners and in nooks and crannies, reinforcing the previous effect.

(14). The dirt accumulated in the lower hull is made with a mix of AK016 and AK023, both with a dark brown shade to obtain a maximum depth.

(15). Although is more difficult to apply the chipping on a light base, we can use pale grey acrylic tones, cream, ivory and even white to achieve this effect using a fine brush.



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17

(16,17). To represent fuel stains and wet effects we will use a mix of AK085 pigment with a dark reddish-brown and AK025 Fuel Stains enamel, to obtain a brown and glossy finish we add some thinner. We will apply this mix around the fuel intakes varying their density and applying it in thin layers to achieve a more realistic result.

(18). In the photo we can see many details painted with acrylics to make the model more attractive, such as the side boxes whose color indicates the different origin of both parts. We also observed the characteristic accessories painted in red on IDF vehicles to identify handles, closures and relevant mechanisms.



18

The exhaust guard rust is imitated with AK013 enamel filters and washes.



(20,21,22,23,24,25). Another way to paint the tracks of this vehicle is using RC081 as the base color. For some types of rust, NATO brown is a very successful tone to be used. As in the previous example, we will use dark gray or black acrylics for the rubber pads. The mud effect is done using a mixture of pigments and diluent. The color will be determined by the finish of the rest of the vehicle. After drying, we will finish the work by rubbing with a dry brush to clean some areas. Finally, and because is a metallic element, we will rub off the teeth and contact areas with a soft sandpaper to make the bare metal appear.



On the tread of the tension wheels and sprockets we will rub graphite to get a high polished surface.

In the area near the exhaust pipe, we will apply AK2038 Smoke pigment dry to define the black soot effect.







**M113
IDF CHATAP**
TAMIYA



III. WEATHERING OF VEHICLES



CHAP.: 3

Heavy vehicles

To finish, inevitably, when we talk about modern vehicles everyone thinks on the big and heavy battle tanks.

Their large size, even in scale kits, will force us to carry out a comprehensive study of the visual references, and why not, a map of effects and its distribution to correctly paint these large surfaces and avoid a boring and monotonous finish.

III.3.1.

M3A3 BRADLEY

The cavalry vehicle M3A3 Bradley was developed by the US in the 80's in response to their soviet homonyms BMP's and replace the old M113. The requirements were clear and consisted in the modernization of the M113's and serve as transport, infantry support vehicles, with anti-tank capabilities and extremely fast.

Even though the hull was built entirely in aluminum making the Bradley a light armored vehicle, the subsequent adding of armoring to improve its resistance in combat also increase its weight considerably. As a particularity to note that all versions of this vehicle have amphibious capabilities.

The A3 standard is an improvement implemented since 2000 incorporating new electronic and digital measurements, titanium in some vital areas and the possibility of mounting a reactive armour together with improved NBQ equipment that convert the Bradley in an adversary capable of destroying more vehicles than the older units.

It was employed by both the Army and the US Marines and it was deployed in the two Gulf wars with a minimum record of casualties in relationship to the number of units deployed. The following kit depicts one of those veteran vehicles deployed to Iraq War in 2003 during a curious exchange between its crew and some civilians. The vehicle has a dusty look as the ones operated in the harsh desert conditions, with accumulation of dust in the lower hull and some wear & tear caused by urban combat.



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(1,2,3,4,5,6,7). The assembly of this model is really enjoyable without any mayor issue. Just some homemade improvements were made using plastic and some aftermarket to turn it into a very nice and interesting model. The presence of damages in different parts, always based on graphic evidence pictures, it will still make it more eye-catching.

7





(8,9,10). Once the model is assembled, we will begin the process of painting the base. This time we will do a preshading effect by airbrushing AK720. The next step will be to airbrush a layer of AK781 red rust without completely covering the previous layer. Finally, to get the correct CARC Tan tone, we will start with a slightly lighter color since the subsequent weathering effects will always darken the paint. Vallejo 009 Sand Yellow highlighted with AK714 is then airbrushed.

(11). To add more interest to the base color we will try to modify the color of the reactive armor with the application of a filter with Tamiya X24 Clear Yellow emphasizing the base tone of the sides and adding a yellow hue.

(12,13). An interesting detail shown in graphic references of this vehicle is the different origin of the armour blocks, so we can apply a decal or transfers on top of some of them adding some scratches. In this case, the decal includes part of an identification or serial number of the donor vehicle. (See PII Techniques - C3. Bases: Identification marks).

After letting the previous filter dry, we will apply another darker filter to get certain depth and general shading using AK045 Dark Brown diluted with White Spirit.





(14,15). To apply this filter, we can use a long and soft brush trying not to puddle with the AK045 tone. Let it dry around 10 or 15 minutes and remove part of the filter in some areas with a flat brush moistened with White Spirit drying on absorbent paper. We will build up different shadows and effects on some details and parts of the vehicle.



The next process will be the application of oil washes on nooks and crannies. In the palette we will use a mixture of Abt.002 Sepia, 130 Dark Mud and 004 Bitume. The linseed oil is removed depositing them on a piece of cardboard leaving them to rest a few minutes.



Use a fine brush trying not to stain the surface too much and subsequently avoiding removing a lot during the application. It is also advisable to work in small areas, controlling the excess and drying time.

Again, after consulting the references, we observe some color markings on some vehicles. Tamiya XF5 Flat Green has been used on parts of the frontal armour. (See PII Techniques-C3 Bases: Identification marks).



(18,19). Partial aspect of the model after the filters and washes observing as it begins to present a more interesting and eye-catching look.



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(20,21).

Also, on the side armour the color of some of the blocks are subtly modified thus achieving greater visual appeal.



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(22,23). One of the most important challenges when painting modern vehicles is to try to apply a correct weathering. In that sense and although the paint today may be more resistant than the previously used, if we check the large amount of available references, we will see how usually vehicles appear in all possible ways, from very dirty to completely clean and in perfect conditions.

As a first action in that sense, we can apply a light and controlled splash effect with a dark brown that also works very well on the CARC Tan. If this effect is applied properly it gives us the impression of small specks of dirt on the large surfaces, a very natural even if you look very closely. For this the ideal is to apply some dark oil such as Abt.130 Dark Mud diluted with White Spirit or similar.

24 Partial aspect after the application of the splashes although this effect is only noticeable at very close range.





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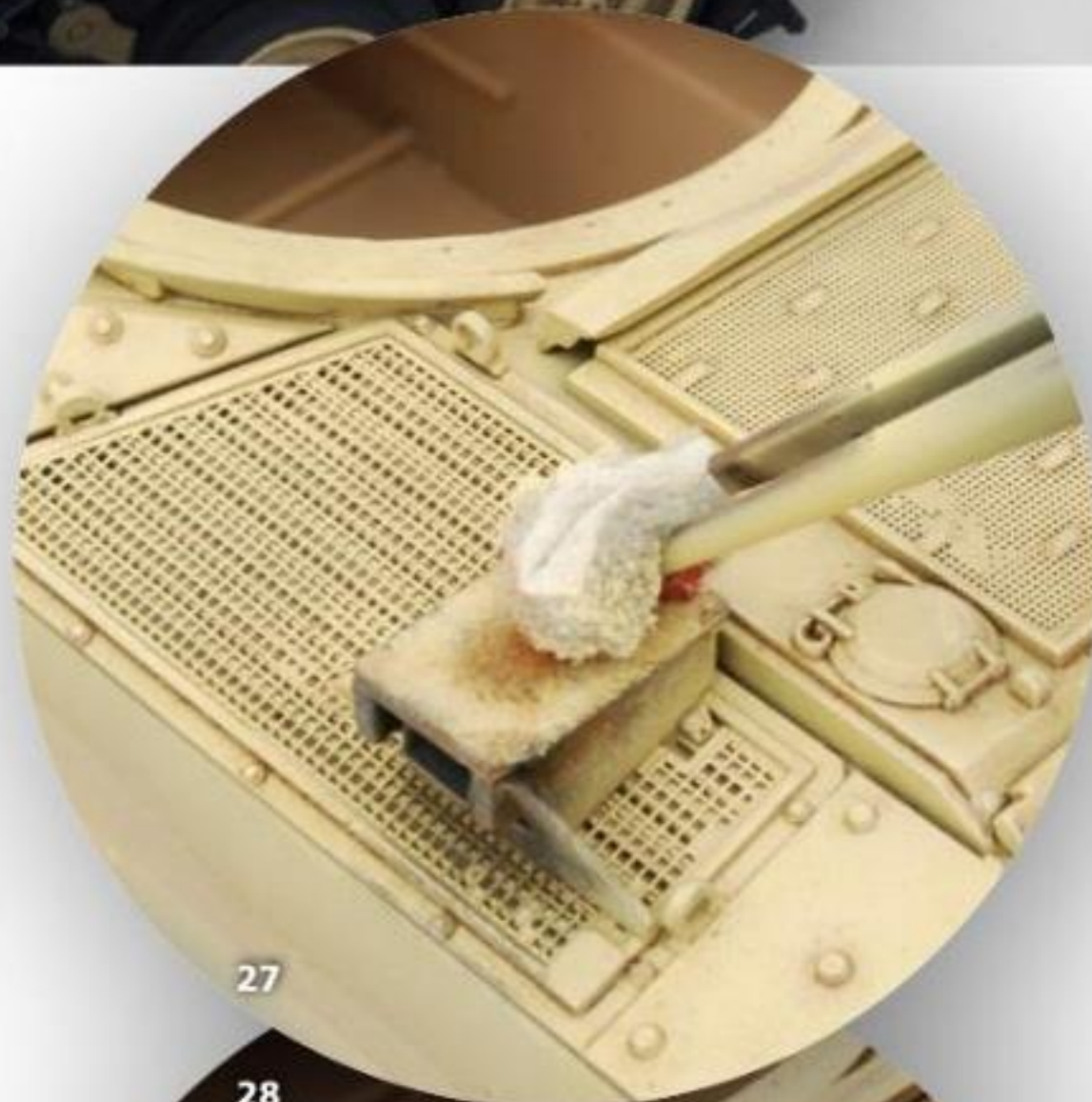
(25,26). But the work with the oils is not limited to applying some filters or washes as we can get much more out of them improving the weathering done until the moment. For this we will apply an extra shading in some areas adding pure oil (we can use the same Abt.130 used in the previous step), blending with a large and soft brush lightly moistened in White Spirit.

(27,28). The representation of rust is a more delicate subject and demands more attention. It is not the same to a vehicle that operates in an arid condition than the ones deployed in humid areas. The vehicles also do not receive the same maintenance or care if it belongs to a rich country or a poor and small country at war. Again, it is essential to have good graphic references to guide us in this process.

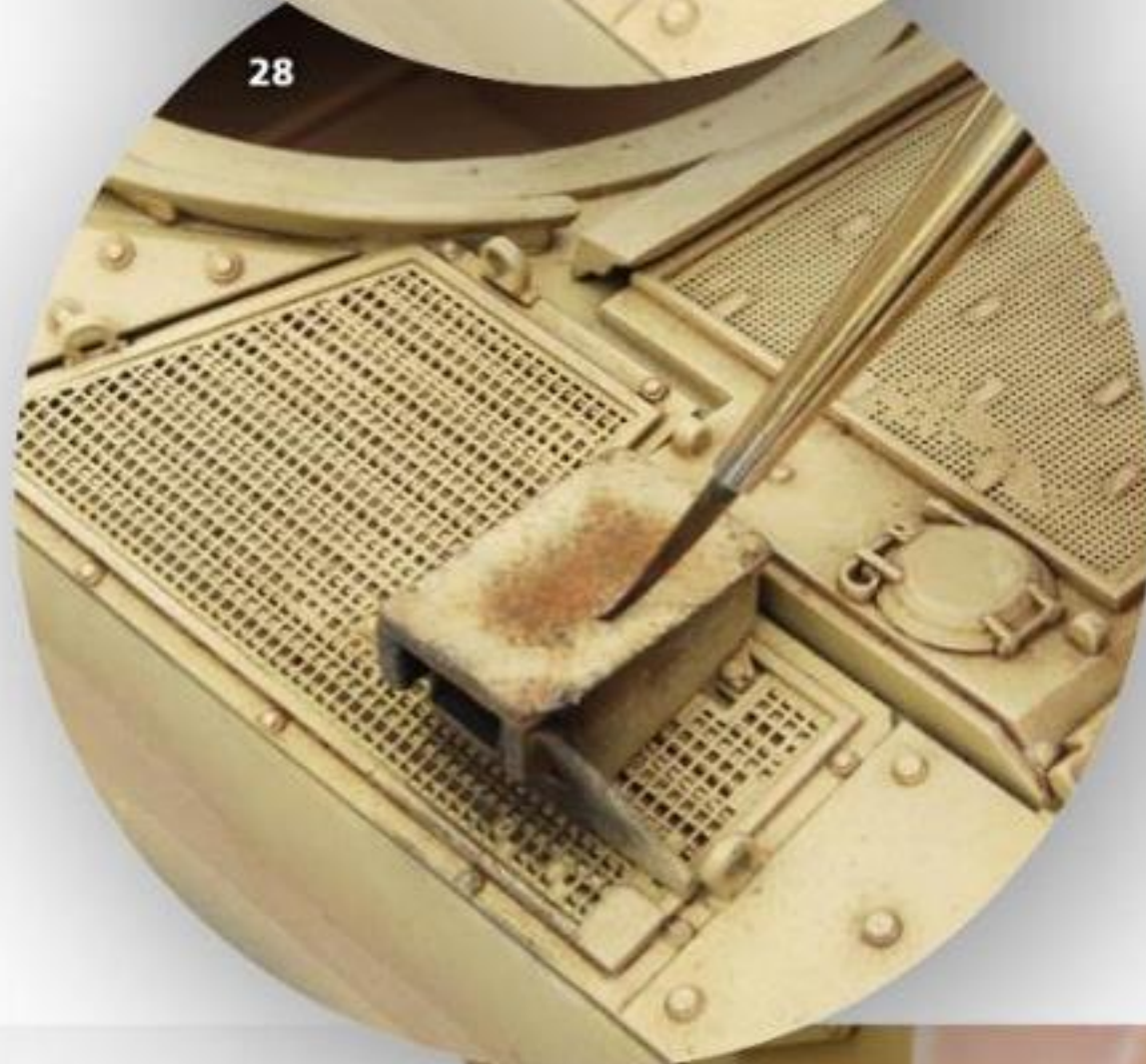
It is common to see some rust traces around the exhaust area due to high temperatures. To apply rust on this area we will use AK707 and AK706 acrylics and a small sponge. We will complete this effect by retouching with the brush to add tonal variety and shape.

(29,30). The chipping phase is completed using AK711 both by brush and a sponge in areas such as around the hatches or access areas, like in this case the rear area. We must be careful without overdo this effect.

In many operational vehicles in Iraq it is observed that their crews have covered tactical markings and symbols to avoid being identified. To reproduce this effect, you can use dark gray acrylic paint applied with a short brush as a tampon adding small streaks with a very thin brush. (See PII Techniques - C3 Bases: Identification marks).



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(31,32,33,34,35). In this sequence of photographs, we can observe a series of chipping effects done with different colors and methods over the side armour, product of all kinds of friction and hits with the environment.



The front skirts are made of thick rubber originally from a dark gray that we will paint with AK720 over the sand AK713 previously airbrushed as base color.



Letting the gray dry for 15 or 20 minutes, with a short hard brush moistened in acrylic thinner AK712 and with great care we can try to remove part of the gray paint letting the base sand color appear again. With this, we simulate the chipping that suffers the base paint applied to the rubber by the effect of friction and scratches, letting dark gray appear, the original color of the skirts.

(38,39). Appearance of the skirts once we applied this technique.





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(40). AK719 and AK720 dark shade are used to paint the wheels and the tracks.

(41). Then the metal part of the tracks receives a treatment based on rust tones using a mixture of AK707 and AK710.

(42,43,44). Present in most operational vehicles in deserts and arid zones, it is time to incorporate the dust into our model. The dust effects are carried out in two parts. First, we will apply the AK088 Chipping Fluid and second the dust itself. After airbrushing and letting dry the fluid, we will apply a mixture of XF57 Buff and XF19 Sky Gray that we will remove with a hard brush moistened in water and various tools reproducing all kinds of scratches and marks. (45). In this photo we can see the effect on other areas and the finish look of the tracks.



45



(46,47,48). To represent dust and dry earth adhered to the hull we will use dry pigments applied and later fixed with White Spirit. Finally, we will add some stains and traces of oil and grease with AK025 Fuel Stains and AK084 Engine Oil.

(49,50). The mud and dirt adhered on the sides are represent using the products for dioramas AK8031 and 8027 that offer a greater texture than pigments. They are splashed along the hull accumulating the product to produce depth and a rough finish. Finally, we will complement the work with different pin washes and AK083 Dark Streaking Grime and simulating some humidity on the lower hull.

(51). Another technique to represent dust, this time on the top of the vehicle, is to use AK723 acrylic very diluted with a solution of water and dishwasher or normal detergent to break the surface tension of the water to reach everywhere.



(52). The idea is to work in small areas making sure that the dust covers all the surface without letting marks.





(53). Then with a soft brush we will remove the solution allowing it to accumulate more in the nooks and less in the center of the panels removing the excess as we dry the brush on an absorbent paper.

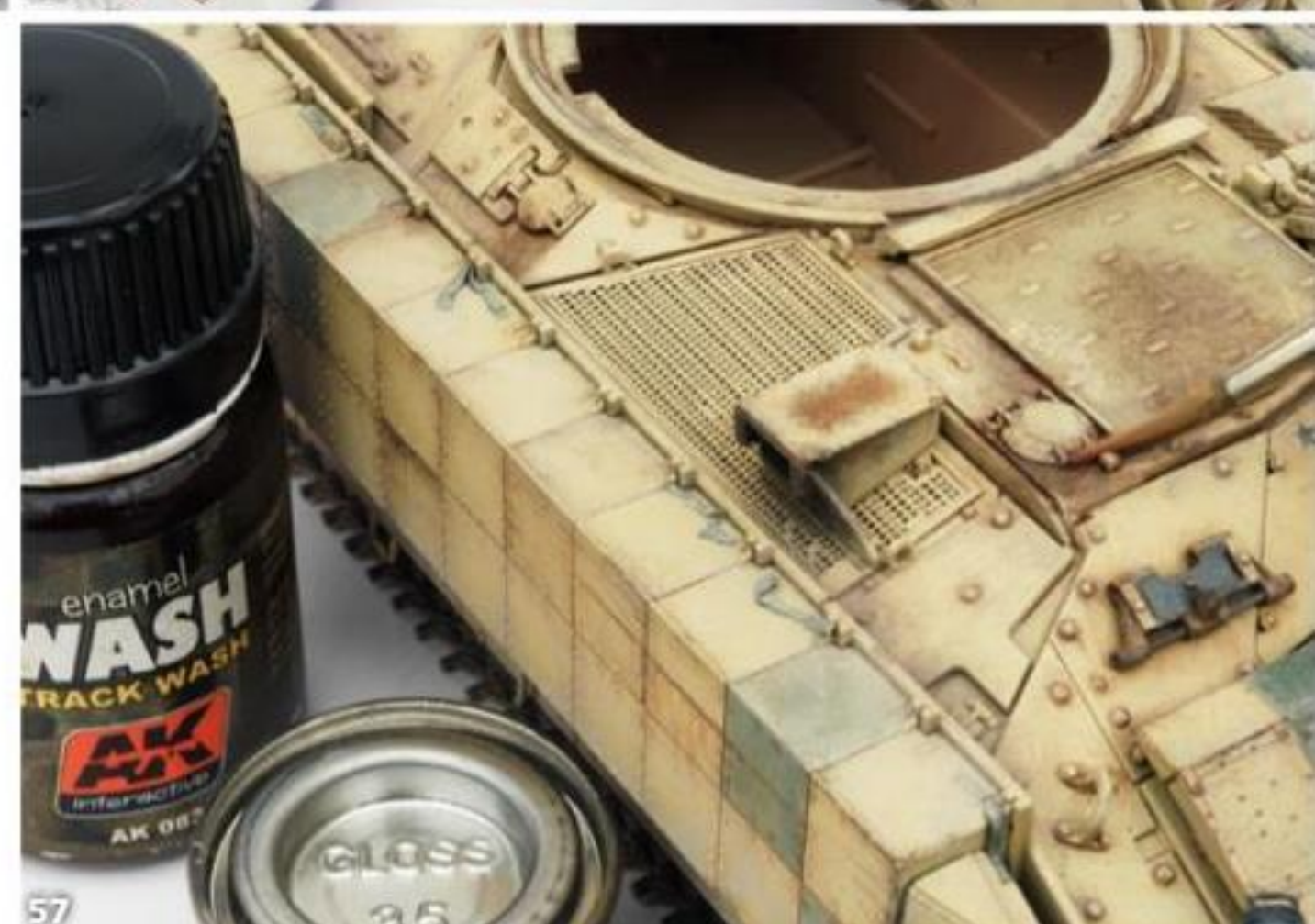
(54). To intensify the effect, we can apply the acrylic less diluted creating some deposits and accumulations in specific areas.

(55). With this same technique we will apply dust to the rest of the upper hull and turret. The whole process can be repeated until you get the desired effect.

(56). The final phase of the weathering process is the incorporation of wet effects such as oil and fuel stains and various fluids that overflow from the vehicle producing splashes, puddles and streaks. Their appearance and placement must be careful, so we use a combination of AK082 Engine Grime, AK025 Fuel Stains and AK083 Track Wash with some gloss varnish to improve the finish.

(57). With a mixture of AK083 and gloss varnish we can reproduce various fuel stains around the fuel caps.

(58). We will add various stains and wet effects on the hull and around the turret, thereby capturing the attention of the viewer, always based on good references and photographs to make this effect as real as possible.





59 Once the weathering of the vehicle is over we can improve and complete the look with some accessories and even figures. They are two important components and it is appropriate to document when adding and placing accessories as part of the load of the vehicle, how to incorporate figures to it, whether they are crew members or not, while both accessories and figures, usually can cause a great visual impact. In the photograph, various elements are painted and weathered applying the same effects as the ones applied on the vehicle. (See PII Techniques - C11 Accessories: Ammunition and figures).



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(60,61,62,63,64). Usually we can also see some vehicles carrying signals or diverse panels. In this occasion they have improvised a warning panel simulating one made in vinyl that we will place in the back and a wooden sign located in the front of the vehicle. Both have been treated with different means and techniques to match the look with the rest of the vehicle.



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(65,66). Not only the accessories that we can incorporate over the vehicles are important, but also their attachment, something that many modelers forget and to which we must pay the deserved attention. It does not make sense to place something on a vehicle and not hold it duly. For this we can use ropes that we will manufacture with different wires, straps and belts that we can manufacture sticking two pieces of masking tape together. (See PII Techniques-C1 Assembly: Interiors and engines).



65 66



365



**M3A3
BRADLEY**
MENG



III.3.2.

T-55 K0

At the end of the 50's the Soviet Union began to develop a new tank called T-55 using its predecessor, the T-54, but with some improvements like a more powerful engine and more fuel capacity, among others. With the beginning of the cold war, the tank received a new development of protection against radiation, being the first Soviet vehicle to incorporate this type of measurements. Around 1963 a new version appeared, the T-55A, to which new improvements were added in that sense.

In general, the vehicles of this family have entered in combat more times than any other postwar tank. The large amount of these old tanks of the first postwar generation in conflicts in Africa, Southeast Asia, the Middle East, Europe and many other countries and regions

of the planet provide us a large amount of reference material. In fact, also that they have fallen into the hands of different armies, sometimes with limited resources for maintenance. For that the configurations have been motley with a lot of damage in combat and many casualties.

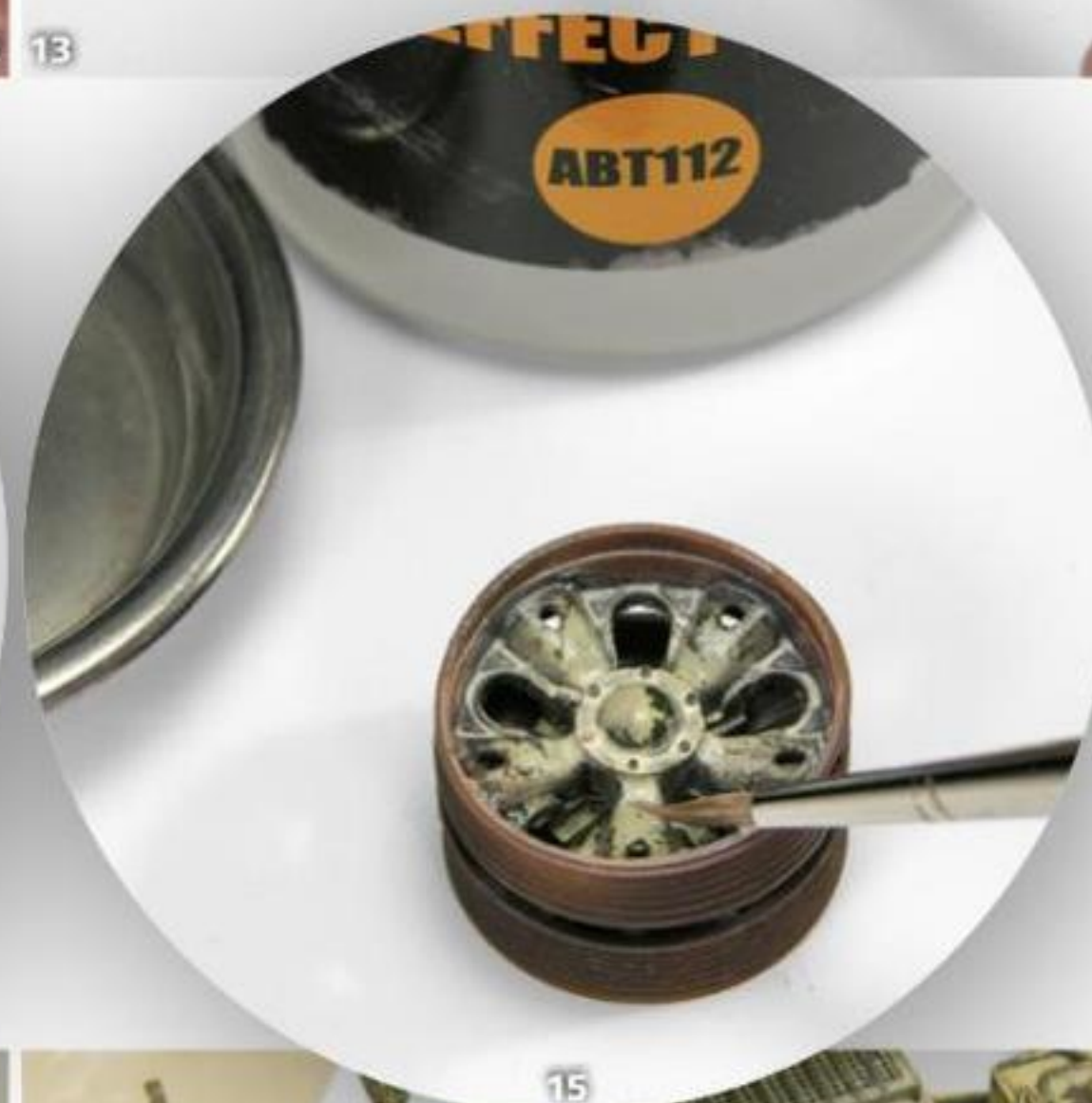
The vehicle that we present below was in Afghanistan back 1981 and as we can see, besides being out of service, shows a total abandonment and deterioration state. That is why a lot of its accessories have been removed and its painting and the appearance present rust and impacts of diverse nature. The weathering consists of accumulated dust and loose dirt, rusty areas and damages in the rubber of the wheels due the heat.

After preparing the base paint and all its effects such as chipping and scratches to represent an abandoned and rust vehicle (see PII Techniques-C3. Bases: chipping fluid-extreme rust), the weathering work should continue as with any other model but with an aspect look of disuse and desolation. In this type of work, it is important to use graphic information to help us during the whole process.





(1) (2,3,4) (5,6,7,8) (9,10,11). In this case we are not going to apply filters, so we go straight to the washes with which we will obtain depth and relief. The sand base color is hidden so it does not make sense to apply filters to modify it. We will use a mixture of 50% enamel AK4161 Neutral Gray and oil Abt.015 Shadow Brown diluted with White Spirit obtaining the advantages of both to apply the washes. In the sequence we observe how we apply it trying to focus our efforts around crevices and reliefs, removing the excess with clean diluent.



(12,13) (14,15) (16,17) (18). The process continues with the wear & tear and fading with oils, although due to the conditions of the base paint and the way of application, our goal is to try not to wear the paint but to burn it with a pale and light finish due to the long exposure to the sun and light. For this we will use a clear palette composed of Abt.135 Light Flesh Tone, 035 Buff, 145 Sunny Flesh Tone and 245 Sand Brown that we will apply on the areas where the paint is still left, blending with Abt.112 matt effect thinner that will guarantee a flat finish without shine as this is the effect we are looking for.



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(19,20,21) (22) (23,24) (25) (26). We can now move to the rust effects with acrylics using in this occasion the Lifecolor references to which we will adding a bit of AK183 Ultramatte varnish. Diluting the acrylic directly with this varnish we will guarantee a 100% matt finish under any condition. In this first phase we will apply the acrylics in different ways depending on each piece or area, both with the sponge and with the brush in the form of pin washes to avoid paint marks and even with a fine brush creating rust chips.



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(27,28,29). In a second application of the rust with acrylics, to obtain some luminosity and accentuate the effect of rust in some areas, we will apply light orange rust located in the edges and reliefs using the tip of the brush.

(30,31,32,33). To finish with the rust, we will use an oil orange palette to improve the appearance of acrylic on very delimited and little zone faded. We will use Abt.080 Brown Wash, 070 Dark Rust, 060 Light Rust, 020 Faded Dark Yellow and 010 Yellow blending on the model's surface.



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(34,35,36). Even though everything seen until now is part of the weathering process, it's now when we start with the bases, when we can really talk about it properly. After airbrushing a layer of brown earth on the hull, we will airbrush another layer of AK089 Chipping Fluid. Next, we will airbrush a rather dark mixture of RC056 and RC057 without completely covering the surface. Once dry, with a brush moistened in water we will begin to remove the dark layer so that the brown layer is visible again. With this, we will achieve the effect of the earth that burns and chips revealing part of the lower dirt and as a base to receive the rest of earth and dust effects.

(37,38,39). To reproduce the dust and dirt on the lower hull we will apply AK074 and AK4062 brown enamels providing a chromatism and matt finish to the side surfaces.



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(40). Before finishing with the sides, we will apply a mixture of dry dark pigments Abt.P034 and P039 on the lower part ...

(41). ... that we will fix with Abt.002 Sepia oil and 160 Engine Grease to reproduce burned grease and oil from the torsion bars.



43

(42,43,44). When we saturate an area with pigments and subsequently we apply Bitume oil painting, Grease or similar, despite its high oil content, the finish is not bright but satin or even matte so such areas with a mix of earth and grease show a completely realistic look.



44



45 46



(45,46). Once the base is finished, we will continue the weathering job on the upper hull. Reproducing the same darkening effect applied on the lower part but around the turret housing because it is an area in which both dirt and debris can accumulate with the soot caused by fire on the rubber of the wheels. After applying AK089 Chipping Fluid, we will apply a mix RC056 and RC057 enamels removing partly with a brush moistened in water.

With the airbrush and the previous dark mixture very diluted, we will shadow some areas recreating the burnt-out effect, but this time without using chipping liquid.



47

(48,49,50,51,52). We will return to the oil paintings to shadow some zones and add more depth. With a dark palette containing Abt.002 Sepia and 015 Shadow Brown we will apply small brush strokes on the top edge of the frontal shield, around the driver's hatch and points that we consider creating thin streaks or blending with very little White Spirit darkening these areas to reproduce a certain handling.



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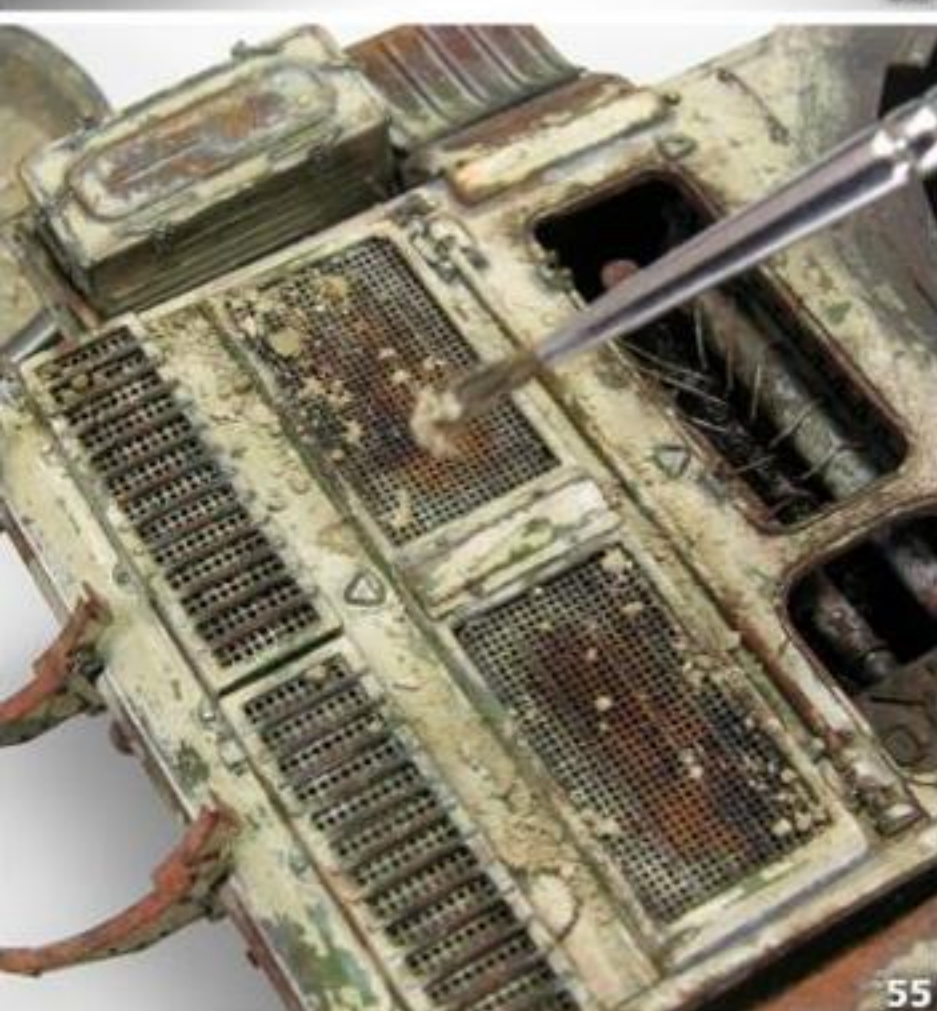


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(53,54). Apply some dry pigments such as Clear Abt.P027 Light Dust and P037 Gulf War Sand on the fenders, especially in the corners and nooks, areas where more dust accumulates, fixing them with White Spirit.



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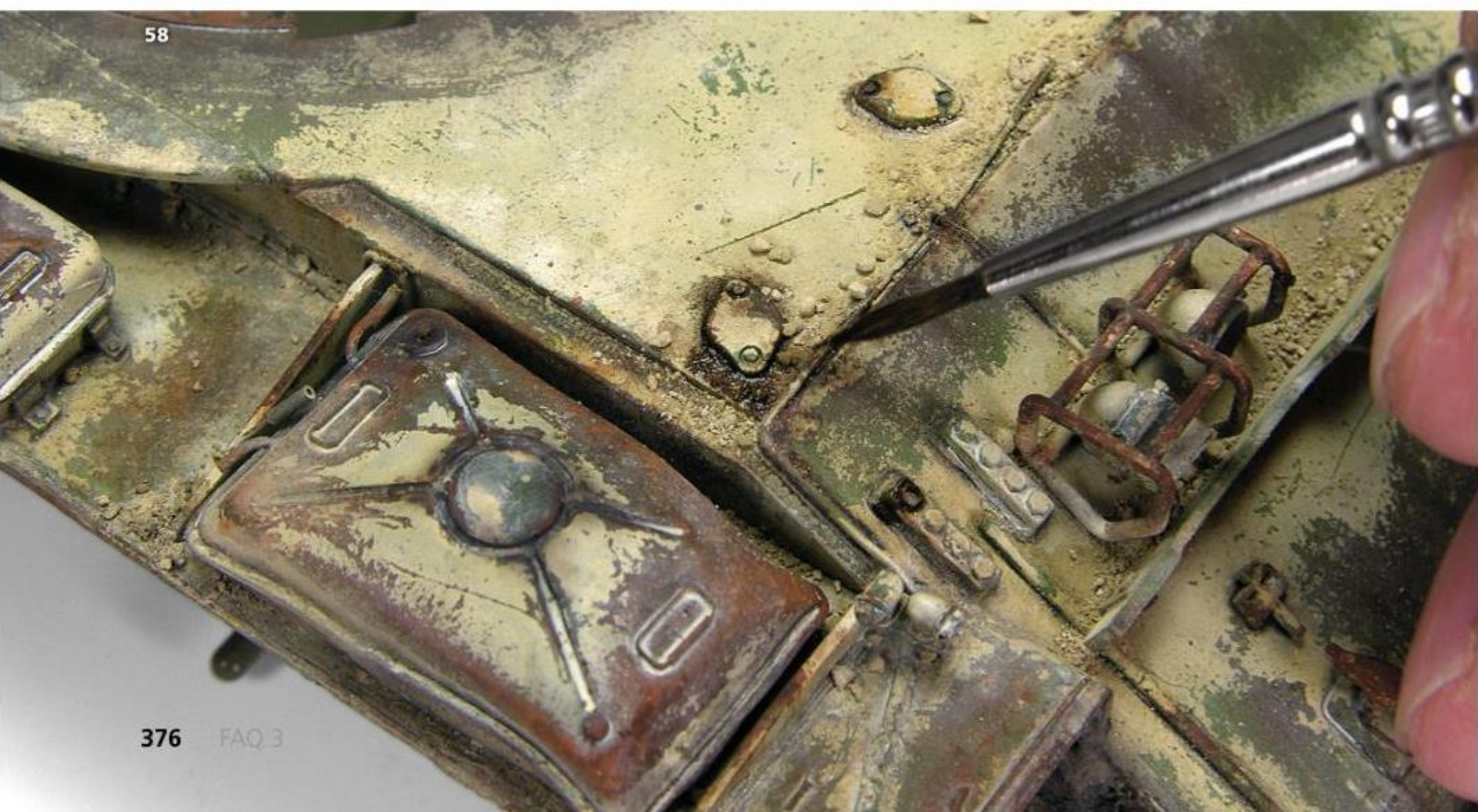
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(55,56,57). Over the back and again on the mudguards because it is an abandoned vehicle, we will apply loose earth and pebbles mixed with a little of the previous pigment to keep them integrated. To fix this mixture we will use AK118 Gravel&sand fixer that we will apply with a brush.

To finish the hull, we apply the traces of the wet effects as in the case of an abandoned vehicle is difficult to see fresh remains of oils and fuel. Therefore, we will apply AK084 or AK025 with Abt.002 Sepia oil trying to depict a satin or even matt effect.



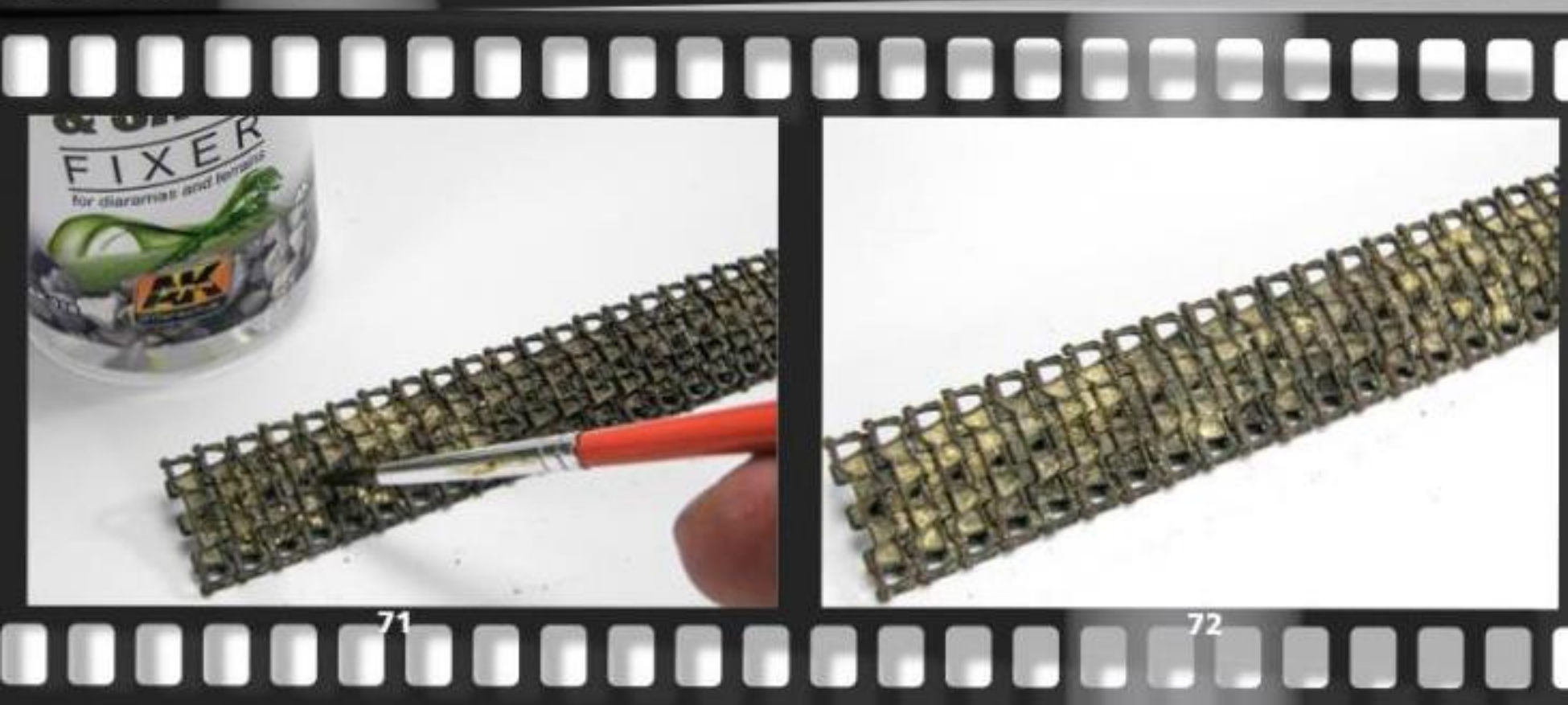
58



(59,60,61,62) (63,64). The wheels also received a rust and dust effect, so to integrate them correctly we will apply soot and traces of oil. We will start by applying pigments to simulate the effects of fire, especially in the central part of the wheel. We will apply the dark ones first (P414 Track Brown and P034 Russian Earth) and then the lightest ones (P039 Industrial City Dirt) to simulate remains of ash. We will fix them with a mix of Abt.005 Smoke and 160 Engine Grease oils.

The Engine Grease is glossy while the Smoke is matte and darken producing a realistic contrast. Finally, we will apply some graphite on the teeth of the sprockets and edges of the tensioners but with caution and without overdo the effect. Once assembled, if the look is what we were looking for we will continue with the work.





(65,66,67,68,69,70,71,72).

Tracks complete sequence of the assembling and weathering. Using burnishing fluid for metal tracks AK159, permit to not paint them and in addition to give a real look once treated.





75



76 77



(73,74,75,76,77). Hull completely finished. When for any reason the wheels lose the rubber, the tracks go down and loses its usual tension.

(78,79,80). Then we only must resume the work on the turret where we had left it, that is, after the washes and oil paintings. The first thing we will do is to paint the periscopes with a dark blue acrylic tone and then apply gloss and a dark enamel wash. Finally, we will apply a light oil tone to simulate some dust.



78 79



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81 82



(81,82) (83,84). As we did on the ring of the hull and the sides, we had airbrushing on the bottom of the turret the same mixture of dark enamels over a layer of chipping fluid, trying to represent the smoke.



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(85,86). Next, we will apply rust and dark contrast on the sides of the turret using bt.002 Sepia, 070 Dark Rust and 020 Faded Dark Yellow oils in the form of streaks and blending with White Spirit.



87

Finally, we will apply negative chips with a light acrylic sand tone and a very fine brush on the handles and some other small parts.



(88,89,90,91) When we work in a vehicle by areas we must be careful and pay attention to all the details to avoid discrepancies after the final assembly.



(92,93,94) The turret received some typical rainmarks using very light oils applied in thin lines on the sides of the turret blending them later with a clean brush moistened in White Spirit or similar. The References Abt.145 Sunny Flesh Tone, 135 Light Flesh Tone and 035 Buff are ideal for it.





T55A
TAMIYA





III.3.3. TYPE 69-II

This Chinese tank is an improvement on the previous Type 59 that was based in the Soviet T-54. In 1969, after the border conflict between China and the USSR, the Chinese captured a Soviet T-62. After being disassembled and studied in deep, many of its parts and systems were used to improve the Type 69. Despite the Chinese discontent with this vehicle and even though most of its armored divisions was equipped with it, turned out to be an export success. During the war between Iran and Iraq, in the eighties, China sold Type 69 to both sides.

At the beginning of 1987 and after 8 years of conflict, during the operation Karbala-5, after several failed offensives against the Iraqi troops, Iran began to concentrate troops, armored and artillery in the

southern sector of the front to launch the final offensive whose objective was the Iraqi city of Basra.

After some successes by the Iranians and at a very high human and material cost, with very weakened troops, at the end of January Iraq launched a counter offensive that defeated the Iranians sweeping the entire area they had managed to capture. The vehicle shown below represents an Iranian Type 69 in the first days of the offensive, in which after collapsing the Iraq defenses, looked like Basra was at the touch of their fingertips. It's totally loaded with gear, packs, rolls with dust and dirt accumulated and the relative maintenance of a vehicle constantly in combat.



(1,2,3,4,5,6). The model was built OOTB. The application process of the base painting, camouflage and identifying marks is shown below. Acrylics have been airbrushed both over the base and the green camouflage spots that have subsequently been highlighted. As part of this process, some accessories have been painted with a brush, also with acrylics. All this will provide an interesting color note.

Once the process has finished and before the decals have been placed, glossy varnish has been sprayed, necessary for them to be fixed correctly despite using specific liquids for its placement.



7

To improve the appearance of the base paint we will apply some specific filters modifying the tone of some parts and areas of the vehicle. Yellow ochre-colored AK261 and AK076 dark brown filters have been used.



8



9



10



(8,9,10).

We will begin the weathering phase using light oil tones, typical of dry and dusty combat areas mixing Abt.001 Snow White with Abt.135 Light Flesh Tone to get a pink color and very pale that we will apply in cloudy pattern all over the vehicle, blending with a soft sponge soaked in White Spirit.

To achieve certain contrasts, we will apply Abt.130 Dark Mud on some pieces and nooks blending in the same way as in the previous step.

11



(12,13,14,15). Also, with oils we can create rust effects on some of the mudguard plates, usually areas of thin metal and easy to damage. We will use Abt.020 Faded Dark Yellow quite diluted so we must control its drying. You can increase this effect around the hatches by adding a darker color like Abt.070 Dark Rust to the previous one.

(16,17,18,19). Moving forward a little in the weathering process we will begin the chipping phase applying them both with sponge and a brush using acrylic dark brown AK711 Chipping Color diluted with water. Its distribution should be random but focusing on the most exposed areas and susceptible to friction and bumps.





(20,21,22,23). As mentioned in the first chapter of this part of the book when talking about the order phases of the weathering process, this time has been altered by applying a dark wash with AK045 at this time and not after the filter phase as it is usual. In addition, not only that order has been altered but also the way of application since it only affects certain parts to increase the depth. After its application, and this is invariable, we will eliminate the excess with a brush moistened in White Spirit or with sponge achieving a soft effect.



24
Observing the vehicle after the process of washes we can see the contrast and depth achieved.



25



26



27



28



29



30

(25,26,27). It is quite common in any type of vehicle, whether modern or not, to find some rusted parts. If in addition it is a vehicle with enough use or age this can be increased but we should not exceed as would be real except in exceptional cases such as in abandoned or burnt-out vehicles. To reproduce them we can use several means. In this case we will use oil Abt.060 Light Rust Brown whose light orange look will allow us to simulate small streaks of rust that appear in some bumps and rubs. After depositing a small point of oil with the brush, with this or with a cleansing stick moistened in White Spirit, we will blend the oil until we achieve the desired look.

(28). We can also use enamels to reproduce the rust effect. Also depending on the way of application, we can get the results to be different to those achieved with oil paintings. Applying enamel AK046 straight from the bottle on more or less horizontal areas and blending it with White Spirit, we can reproduce the effect of rust on wider areas and without slope.

(29,30). Finally, we can also reproduce the rust with dry pigments fixed with diluent or even specific fixer AK048. In this case, rather than reproduce it directly, we will try to intensify the effect of the rust reproduced with enamel. This way we will enrich the look and we will add some texture. Simply apply dark brown pigments like AK085 or AK2042 combined with reddish or orange tones such as AK043 or AK044 over the areas in which we had applied enamels.

(31,32). The final phase is the wet effects used to reproduce details as the oil stains and/or fuel spills, entirely done with AK025 and AK084 enamels applied and blended directly on the fuel caps and engine hatches.



(33,34). Once finished and after checking every inch of the vehicle, we will touch up those pieces or places where the effects have not been reproduced as desired. In this case it has been believed convenient to reinforce the dust accumulated on the projector and front vision system located on the turret using washes with more load of pigment.





TYPE 69-II
TAKOM





III.3.4. MERKAVA MK.I

The idea of building and manufacturing an entirely Israeli battle tank dates to 1956, the year in which the war between Egyptians and Israelis proved the importance of the battle tank as a determining weapon. The priority of the initial design is to optimize the survival rate of the crew as well as minimize the repair time of the damages caused in combat. These premises were decisive at the time of developing new spaced armor and modular fast replacement designs. In addition, the geometry of the vehicle with a turret placed not in the center of the hull, copying self-propelled artillery and so far, rare in this class of armored vehicles, added additional protection to the crew against frontal attacks (mass and space has been added between them and the front of the vehicle).

The first version called Mk.I came into service in the IDF in 1979 and its production continued until 1983 when it was replaced by the Mk.II. Since it was deployed for the first time during the Lebanon War

in 1982, going through its participation in the second intifada in 2006 and up today, more than 2500 vehicles have been produced in 4 variants and it has undergone many modifications and improvements.

The model that we present below tries to reproduce the first version still in service during the Lebanon war in 1982 when Israeli troops took Beirut. During the fighting urban vehicles suffer damages from friction and typical dust when operating between rubble without too much mud precisely because move on compacted and even paved terrain.



(1,2). Despite talking about a model with more than a quarter of a century since its manufacture, this tank has inspired a lot of manufacturer in last years when it comes to producing further variants of the Merkava and incorporating them into its catalog. We are not facing an OOTB building, but adding a PE set, metal tracks and certain homemade improvements based on metal sheet, plastic and wire. We make this dinosaur kit surprise us, so we can be satisfied. Still being a good model.

The focus of this article will be different from the rest. In its development we are not going to describe the weathering processes, something that has been done in the other articles of the book, but we are only going to name them showing their order of application during the whole process.

Although not all models are assembled in the same way and each modeler uses its own assembly strategy, the design of quite a few modern vehicles is very similar and therefore we can generalize when it comes to how to approach painting work and when to apply the different weathering techniques.

In the first chapter of this part of the book devoted to weathering full vehicles we had introduced the weathering process, explaining each of its phases and introducing a flow chart, more or less generic, to show the order of application. Let's see it in a practical way over this MBT but trying to generalize as much as possible.

Our model and its different accessories are painted in a proper base color and have all their identifying marks painted or placed therefore we go directly to the action.

LOWER HULL

After this process we have the lower hull and suspension system ready for the weathering and next steps:



WASHES WITH ENAMEL



WASHES WITH DRY MUD ENAMELS



SPLASHES WITH LIGHT DRY MUD ENAMELS



PIN-WASHES WITH THE SAME MIX USED IN THE SPLASHES



REMOVE EXCESS WITH WHITE SPIRIT



RUST AND CHIPPING WITH ACRYLICS



SPLASHES WITH DARK EFFECTS ENAMELS



PIN-WASHES WITH DARK MUD EFFECTS AND WET EFFECTS

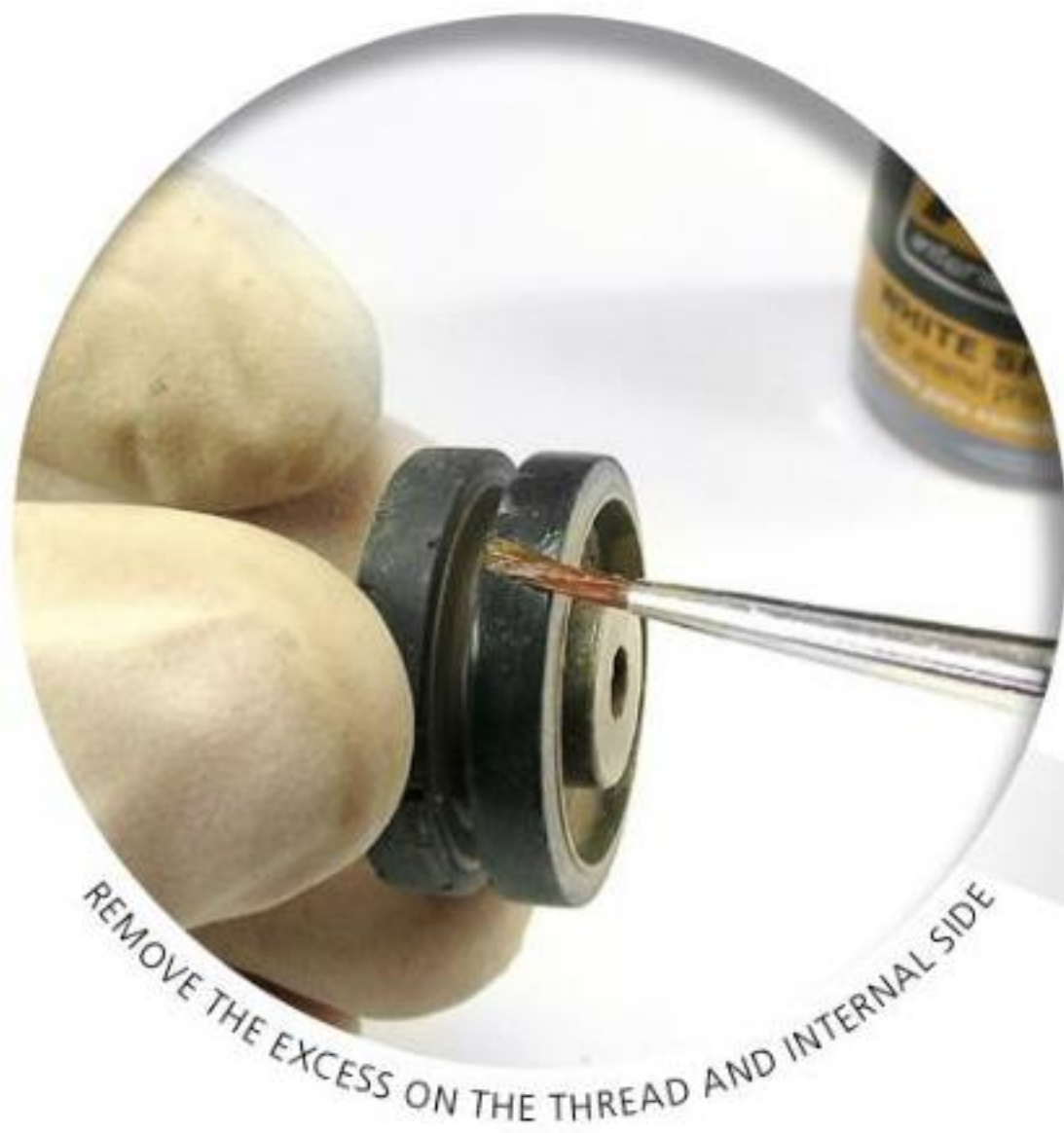
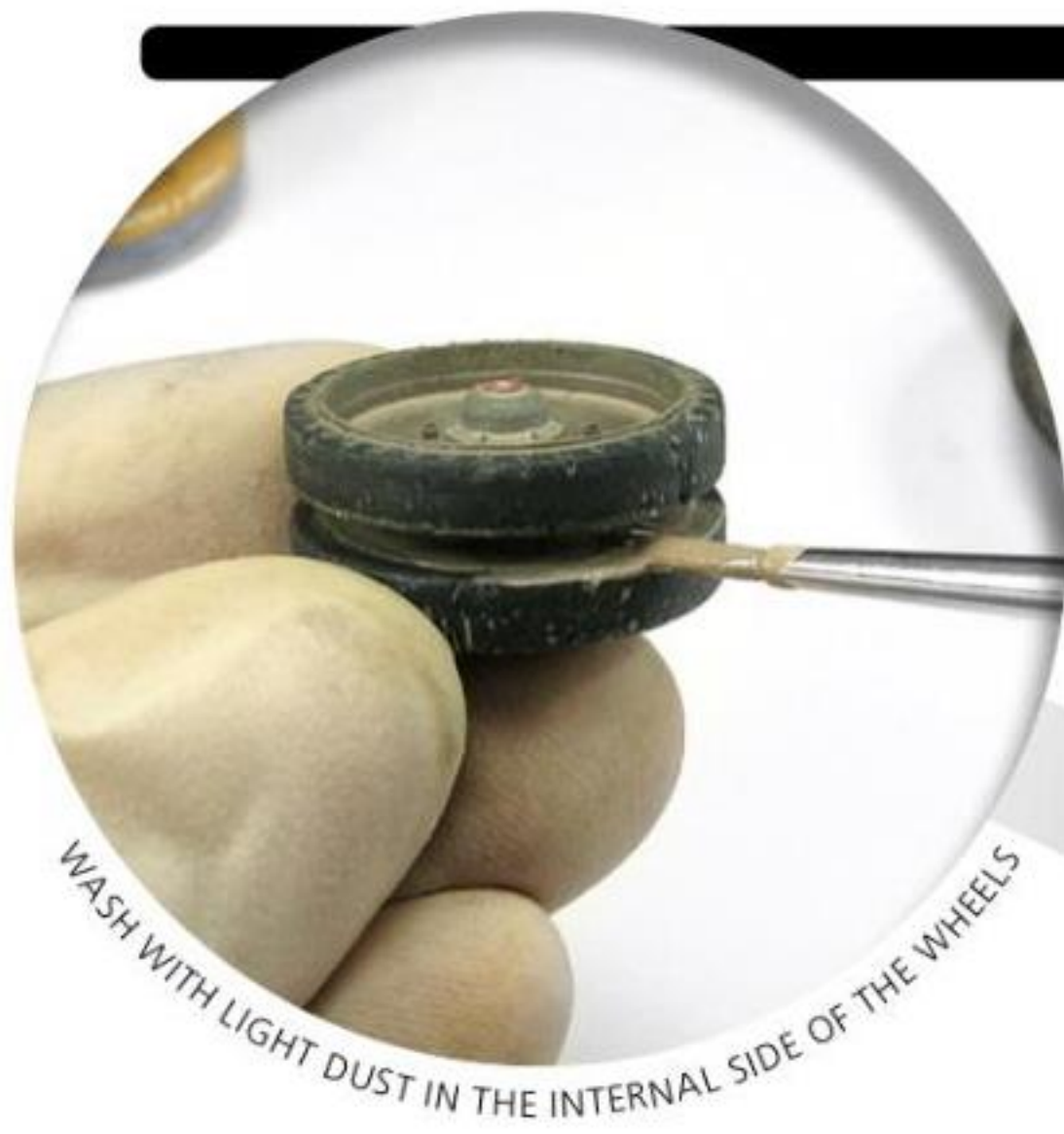


Overall look of the lower hull



WHEELS

Next, we will work on the wheels and Idler/Tension wheels.





POLISHED METAL USING GRAPHITE



WET EFFECTS OF OIL AND GREASE USING OILS AND ENAMELS

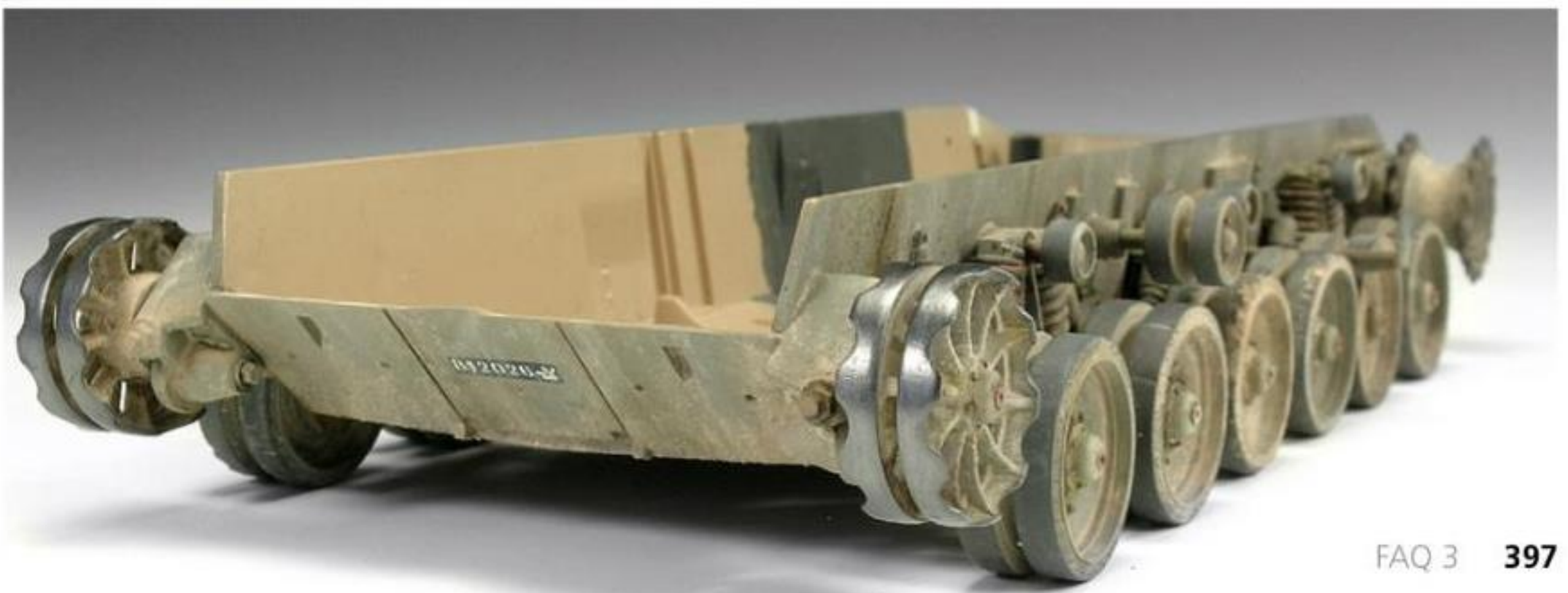
ASSEMBLING OF THE LOWER HULL AND WHEELS

Once the lower hull and wheels are ready we can assemble the whole set taking care, as the pieces are painted and we can spoil the work done. Use latex gloves.



Overall look of the set of wheels.





LOWER HULL AND TRACKS

At this point, we have the hull and the set of wheels but without tracks. On the other hand, we should have the metal tracks, usually more comfortable and simple to assemble and paint, completely finished. The process of paint is the usual and we can find an example of it in the weathering process of the T-55 in this same chapter of the book. Therefore, we will proceed to its fitting and assembly with caution using latex gloves, finishing the work on the lower hull of the vehicle.



Final look of the complete lower hull with the wheels and tracks placed.



UPPER HULL

Usually modern battle tanks kits, because of their shape and characteristics, have a similar design. After finishing with the lower hull, we usually find a part that covers it formed by the upper hull, the fenders and the side skirts that would correspond to a second large assembly block and painting. We would begin to apply the following processes:



WASHES WITH ENAMELS



REMOVE THE EXCESS



PIN-WASHES
WITH OILS





CHIPPING WITH LIGHT ACRYLICS



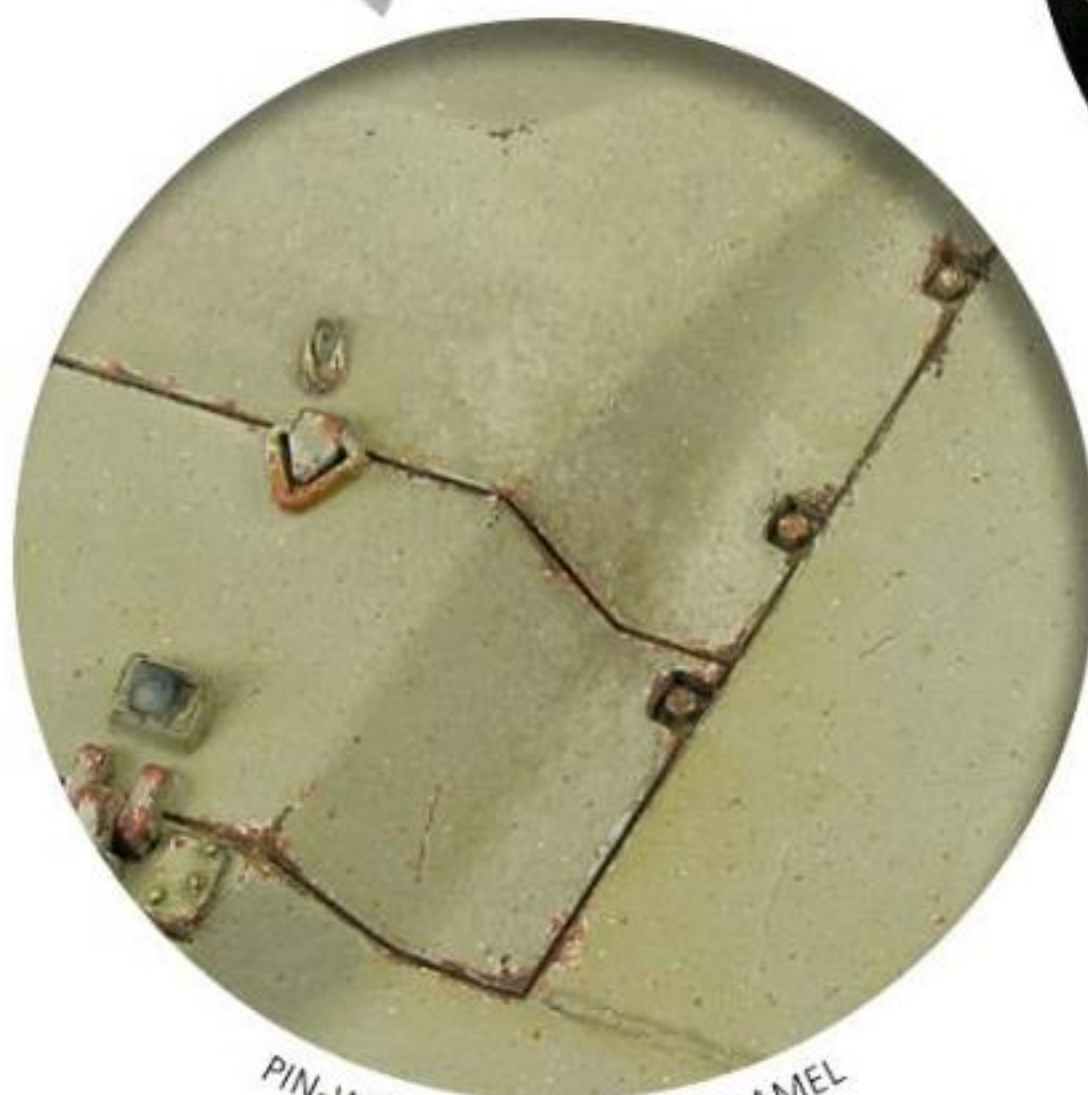
CHIPPING WITH DARK ACRYLICS



CHIPPING WITH DARK ACRYLICS



CHIPPING AND RUST WITH ENAMELS

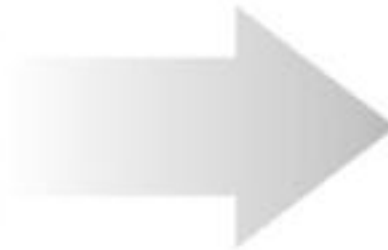


PIN-WASHES WITH RUST ENAMEL

SIDE SKIRTS



WASHES + WEAR&TEAR AND
SPLASHES WITH OILS +
CHIPPING WITH DARK
ACRYLICS + RUST WITH
ENAMELS AND OILS



RAINMARKS + STREAKS
+ SPLASHES WITH DARK
EARTH ENAMELS

ASSEMBLING OF THE HULL

Now we have both subassemblies finished. On one side, the first group of the lower hull with the wheels and the tracks. On the other, the second group formed by the upper hull and the side skirts. We just have to assemble them and check the gap front and back because the lateral ones will be covered by the fenders and possibly the skirts or lateral armour shields.



Overall look of the completed hull



COMPLETED HULL

Then we can keep working on the hull.



PRE-DUST EFFECT WITH AIRBRUSH



PRE-DUST EFFECT WITH AIRBRUSH



DRY PIGMENTS

Overall look of the pigments

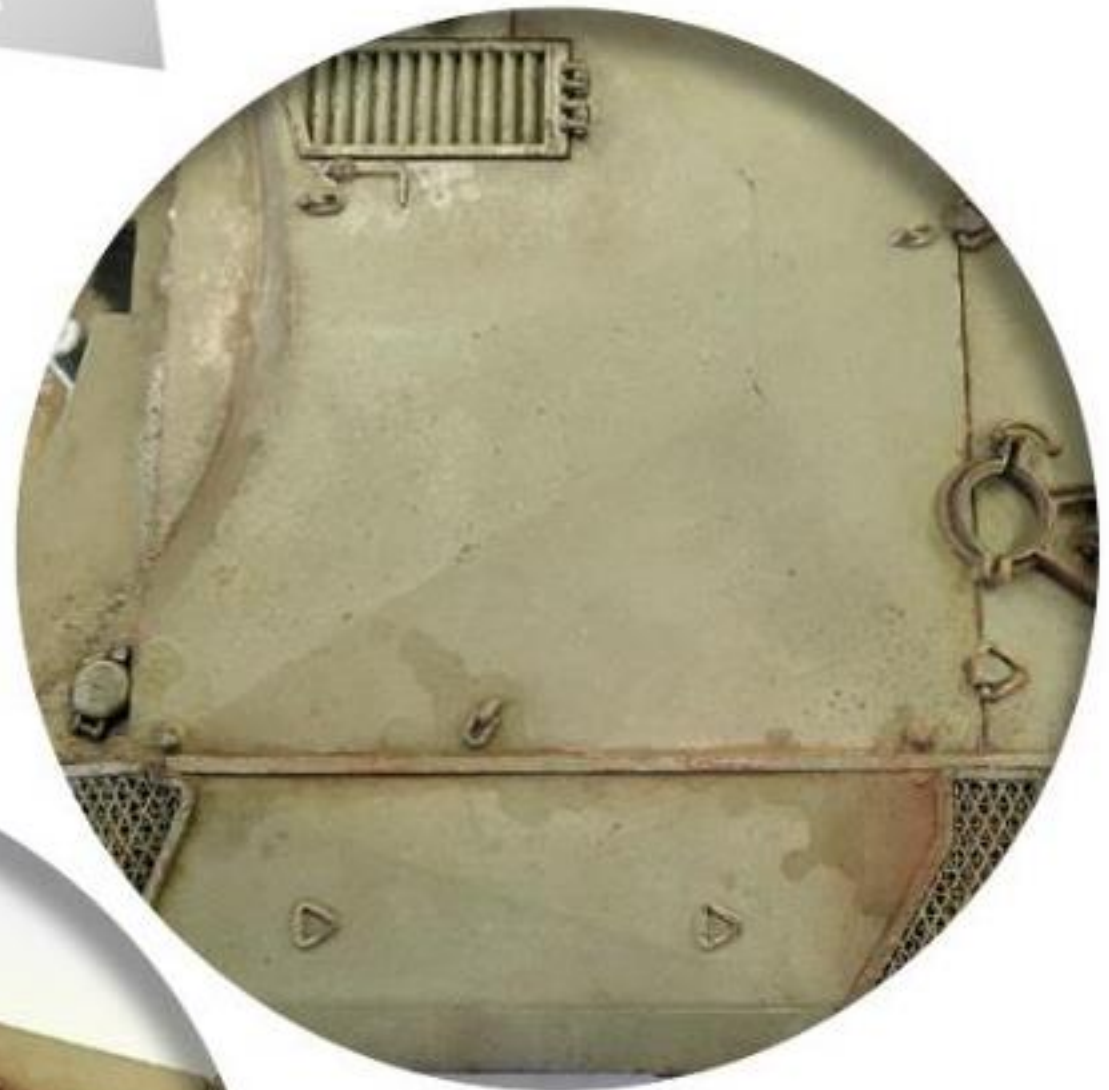




SPLASHES WITH DRY
EARTH



WET EFFECTS WITH
OILS





WET EFFECTS WITH
ENAMELS



TURRET

The last phase consists in finishing the whole turret. To build and paint in an independent way separately is an advantage. These are the steps applied during the weathering:



WASHES WITH ENAMELS

OILS DOTTING





CHIPPING WITH LIGHT ACRYLICS



CHIPPING WITH DARK ACRYLICS



RAINMARKS



RUST WITH OILS



BLEND THE EFFECT





PIGMENTS



WET EFFECTS WITH OILS, ENAMELS AND WET EFFECTS FLUID



TURRET FINISHED



FINAL DETAILS

The weathering process in general terms finish here, but all the work done wouldn't be completed if we don't consider the small details. Now we work on the polished metal areas such as the muzzle or towing hooks and the blackened. We can't forget the oil around of the smoke outlets of the engine by the effect of gases, oil and unburned fuel.



SCRATCHES AND METAL POLISHING WITH GRAPHITE OR METALLIC PIGMENTS



SMOKE WITH PIGMENTS



WET EFFECTS, OIL AND GREASE STAINS WITH ENAMELS AND OILS OVER THE EXHAUST





MERKAVA MK.I
TAMIYA



IV. THE FUTURE OF MODELLING

Scientifically, an object is three-dimensional when it has three dimensions, in other words, when the points that form it could be in space based on a coordinate system of three axes.

A basic example of all this would be to talk about width, height and the depth of a given object. Even though physics, mathematics and geometry go much further in the contemplation of space and its dimensions, which certainly do not have to be necessarily three but even some more, they will be enough for us to speak about just three. From this point of view, no one can deny that modeling, such and as we know it so far, it's 3D, we can measure and touch our models and pieces.

But then, what does 3D mean? Simply when we speak about 3D we are really talking about a new technology of manufacturing compared to the conventional used to this days by the big manufacturers of scale model's kits.

This new technology that has just recently entered the market, now is just applied by some retailers of parts and accessories in order to detail and update our models. It is revolutionary in terms of its level of detail and possibilities of representation and manufacturing of pieces; until now unimaginable using current conventional plastic injection technology.

Surely in the coming years, the big model makers will surprise us by introducing this technology on their design tables first and then on the production lines, offering models entirely designed and manufactured with 3D printers with levels of realism that will surprise us.



CHAP.: 1

Digital 3D revolution

We have been listening a very familiar term called "3D" for several years. But what do we really know about this?

The truth, it is a question that many of us ask ourselves, looking for the answer of what is really important for us.

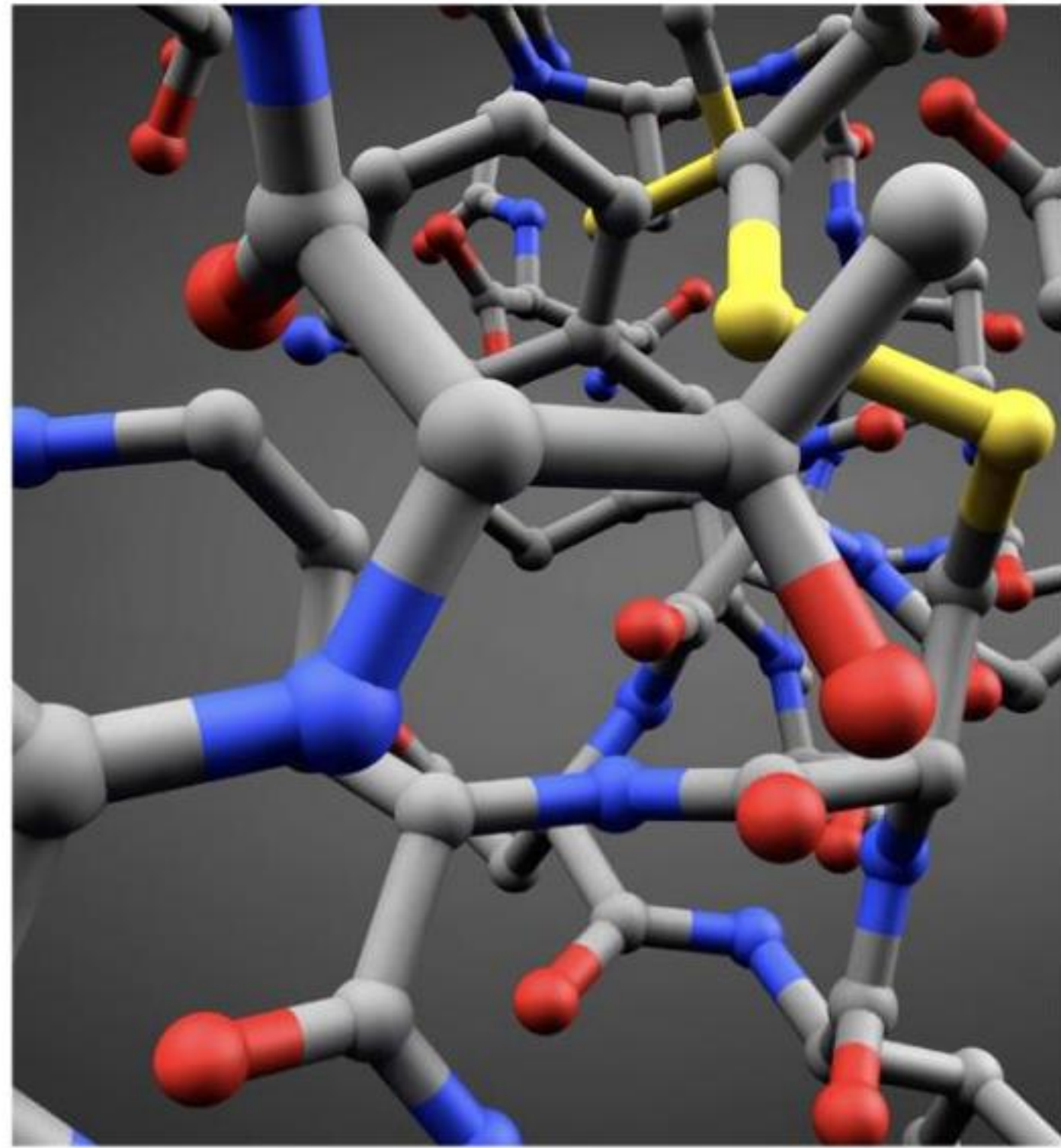
Digital manufacturing

Even though in the last few years 3D production has been considered as revolutionary, we must highlight that what has really been revolutionary is the development of the systems of computer-aided design (CAD), as well as the different programs created for the computer aided manufacturing (CAM).

In modelling, it hasn't gone unnoticed, and as the rest of industries, the use of these advances has supposed a turning point inside the sector.

Day by day, we can verify how the products have evolved thanks to the power of the design programs and the control in the manufacturing process. In modeling it translates into better molds for the injection of plastic, better metallic complements thanks to the numerical control in the machining process, as well as a remarkable evolution in the techniques of design and obtention of photoetched parts.

Finally, we are facing the last step, which is the rendering of products ready for sale by manufacturing them through addition techniques, commonly known as 3D production.



3D production or AM additive technology

We can define 3D production as a manufacturing process of solids by the overlapping of material forming the geometry of the object, without the need of any other element to contain it or materialize it, finding the desired shape in a virtual data file. There are different techniques for the execution of this process according to:

- The input method (punctual, linear or superficial).
- The element used for the cementing (in form of light or heat)
- The state in which the material is found (solid powder, liquid...).

Within the previous methods we can distinguish the following techniques or Addition of Material processes:

- a) Photopolymerization. It consists in the consolidation of a liquid photopolymer from a selective polymerization layer by layer by means of a light. The delivery of material is carried out superficially.
- b) Polymerization by ultraviolet light radiation on liquid material.
- c) Consolidation of the material in powder format in a superficial way with different curing techniques.
- d) FDM or modelling by layers of melted plastic.

The technique consists of the dissemination of the material, generally thermoplastics, through a hot mouthpiece. The material melts and is extruded on the surface linearly, the material consolidates by



cooling. Depending on the number of extruder mouthpieces, the machine can represent pieces of different colors. It needs supports and the pressures are of the order of 0.1 mm of thickness layer.

Materials

The main consideration at the time of designing any type of object is determining which material is suitable, since the end result will depend on this aspect.

There are many materials, all of them subject to different patents, in which their composition and manufacturing are jealously protected since it is the main commercial appeal of this technology.

The main or most developed ones have been the polymers commonly known as plastic and resins. There are many varieties and their trade names do not normally attend their composition, thus they are difficult to recognise and differentiate, being. One must obtain a sample to assess the advantages and disadvantages of each of them.



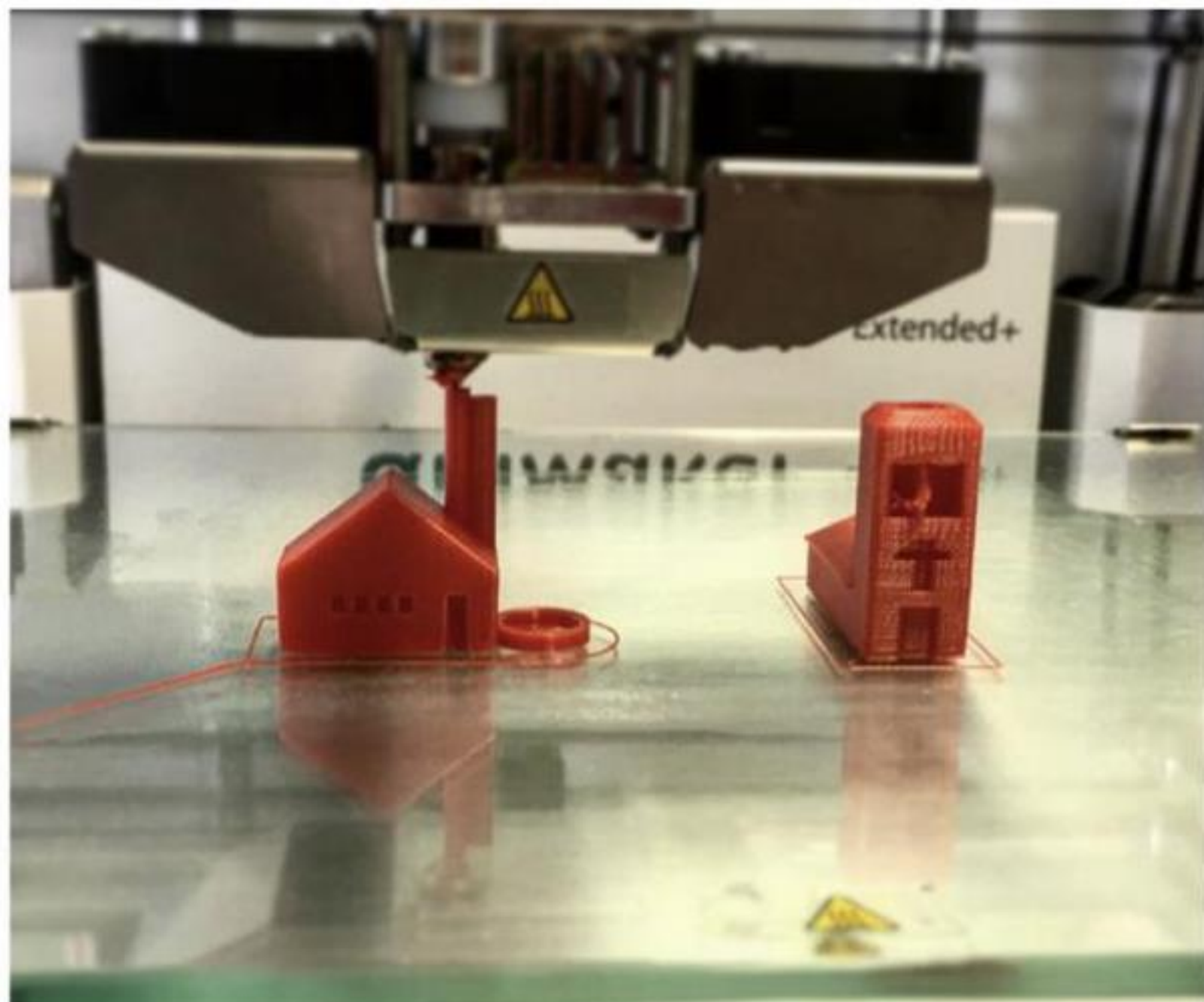
Materials and AM manufacturing systems used in modelling

For determining which material and manufacturing system is the most suitable one, we must initially consider the characteristics and properties that the object to be built must fulfill, not being the same a mold, a master, or a final object.

We are going to focus on the generation of pieces for masters that later can be replicated by vacuum washes, as well as obtaining the final pieces produced directly by 3D printing systems.

Generally, we can conclude that the manufacturing systems and materials used by polymerization, namely SLA, Araldite@Digitalis, DLP y Polyjet systems fulfill the modelling needs.

All of them need support material, and involves a post-process work of removal of this material. Depending on the difficulty its removal, it will be considered more or less suitable for its use.



Comparison between products printed in 3D

Tests have been carried out with two printed materials in two types of machines with different technology, and that due to the peculiarities of each both are optimal for modeling.

Manufacturing systems

Case A. Manufacturing device by addition of material Project 3500HDMMax from 3D System brand. It is a professional machine with Multi-Jet technology (Polyjet), with a layer thickness of 16 microns. The material used is Visijet @ M3 Crystal it is of a polymer curable by ultraviolet light. **(1)**

Case B. The manufacturing system used was Aureus Plus from Envisiontec® brand. Professional machine designed primarily for jewelry, with a resolution in the XY plane of 43 microns and a layer thickness of up to 25 microns depending on the material used. The system used is the DLP. The material used has been a RCP Nanocure Series photopolymer of the own brand. **(2)**

Example

The printed piece has been designed from real measurements and is found reproduced in plastic inside the AMX-30B (TS-003) and AMX-30B2 (TS-013) Meng kits, to establish a difference with manufacturing by conventional methods. It is the lid of the left dome of the handle where a Browning cal machine gun. 50 is located on an AMX-30 EM-2 tank of the Spanish army. **(3,4)**



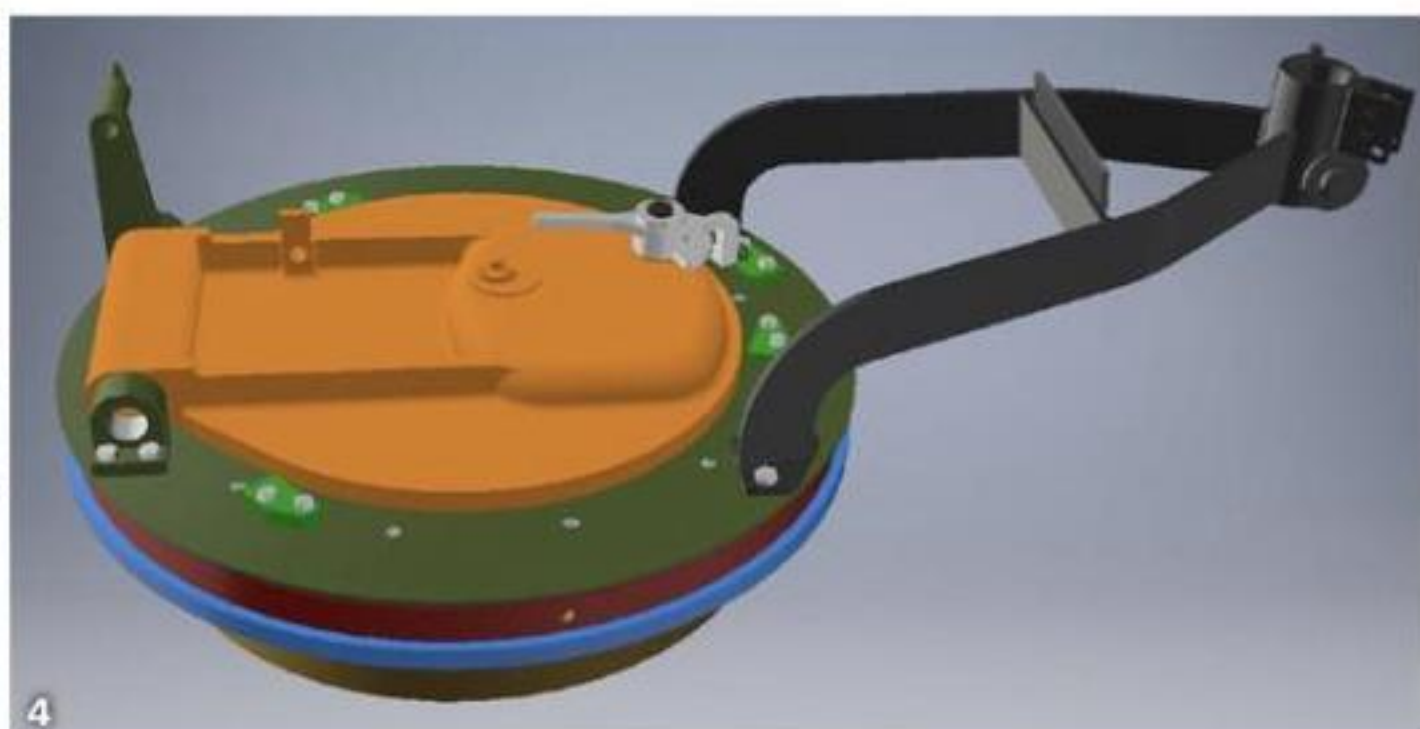
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2



3



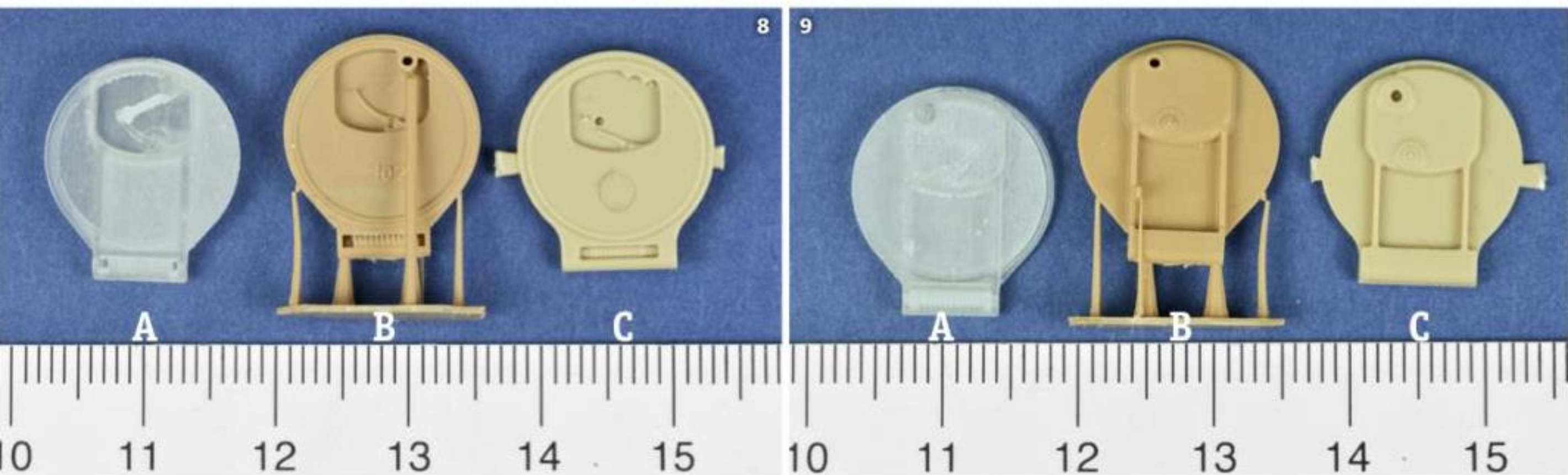
4

The size of the piece is approximately 15 mm in diameter and it has an average thickness of 0.6mm. The piece has been selected because of its variety of shapes, with flat and rounded areas, its small details and its brightness. **(5,6,7)**



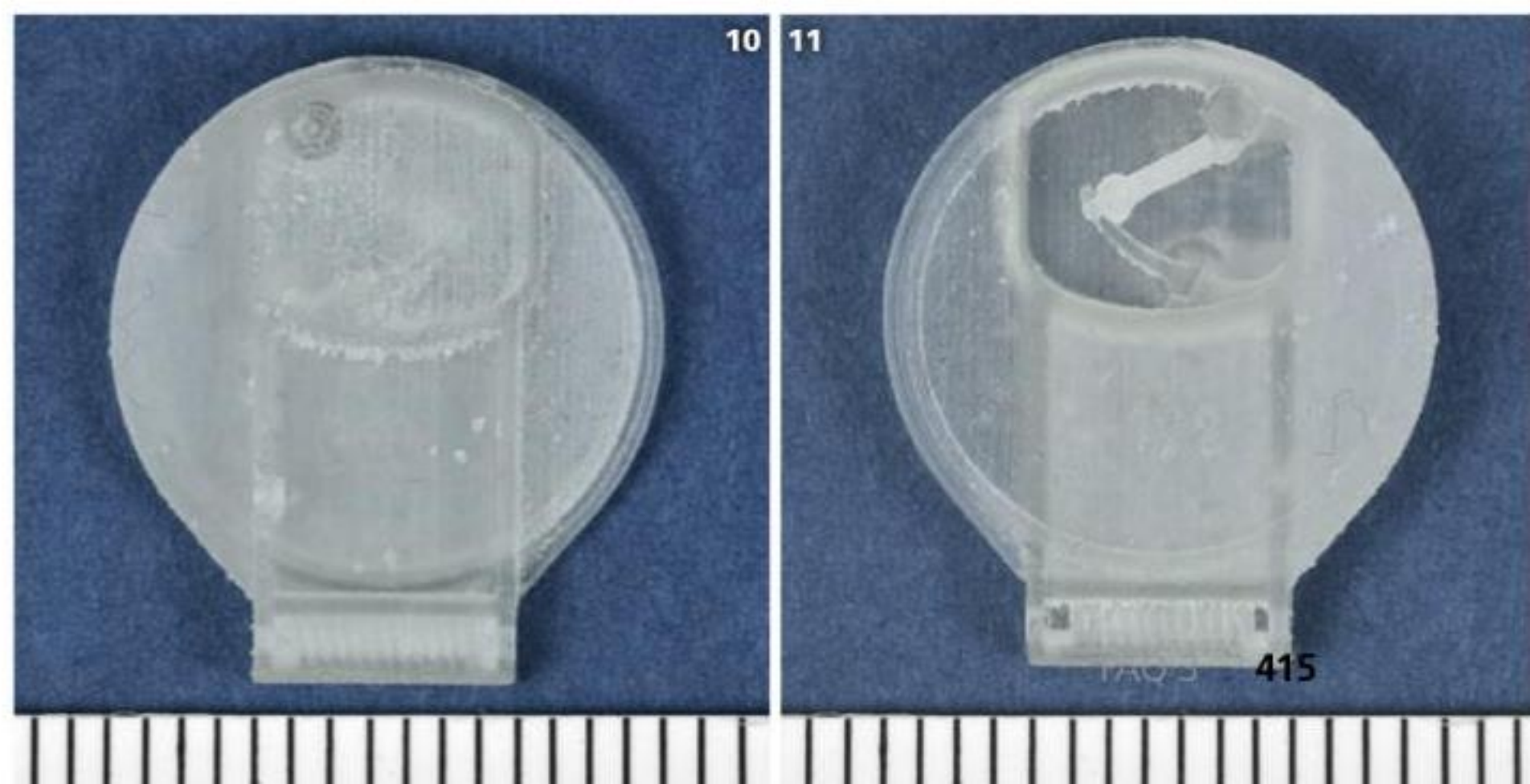
Manufacturing

In the figure we can see the result of the pieces once manufactured by the different methods. Each letter designates the system of manufacture and material already mentioned, case C is the injected plastic part from Meng. **(8,9)**

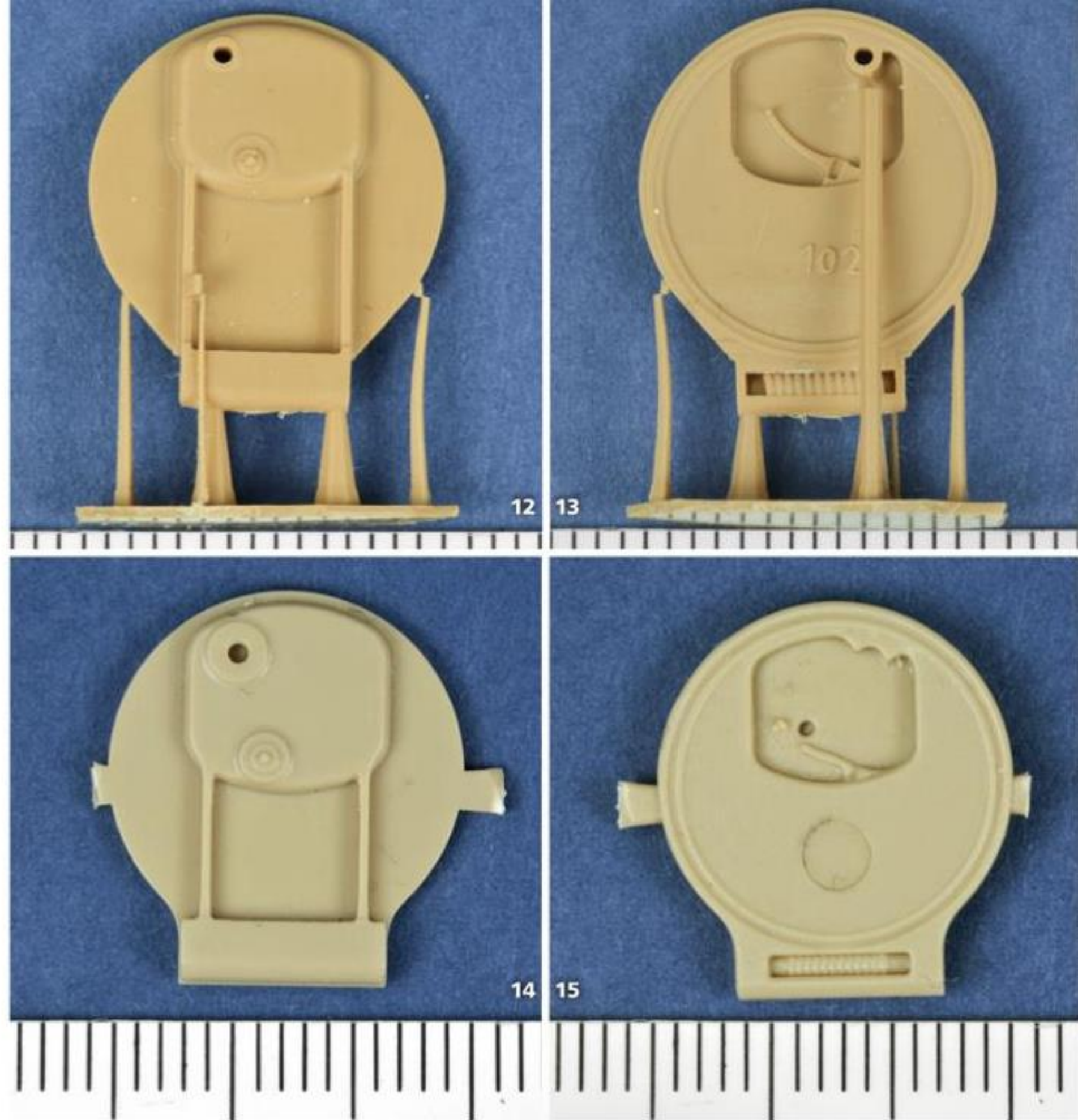


Support material

At first glance, we can see the necessary supports for the execution of some parts of the piece. On piece A, the whitish support that is deposited on the bottom. After a cleaning the piece, a portion still remains attached. **(10,11)**



On piece B, the support material consists of a series of structures placed on those points where the machine considers it is necessary. The rest of the piece is totally clean. **(12,13)**



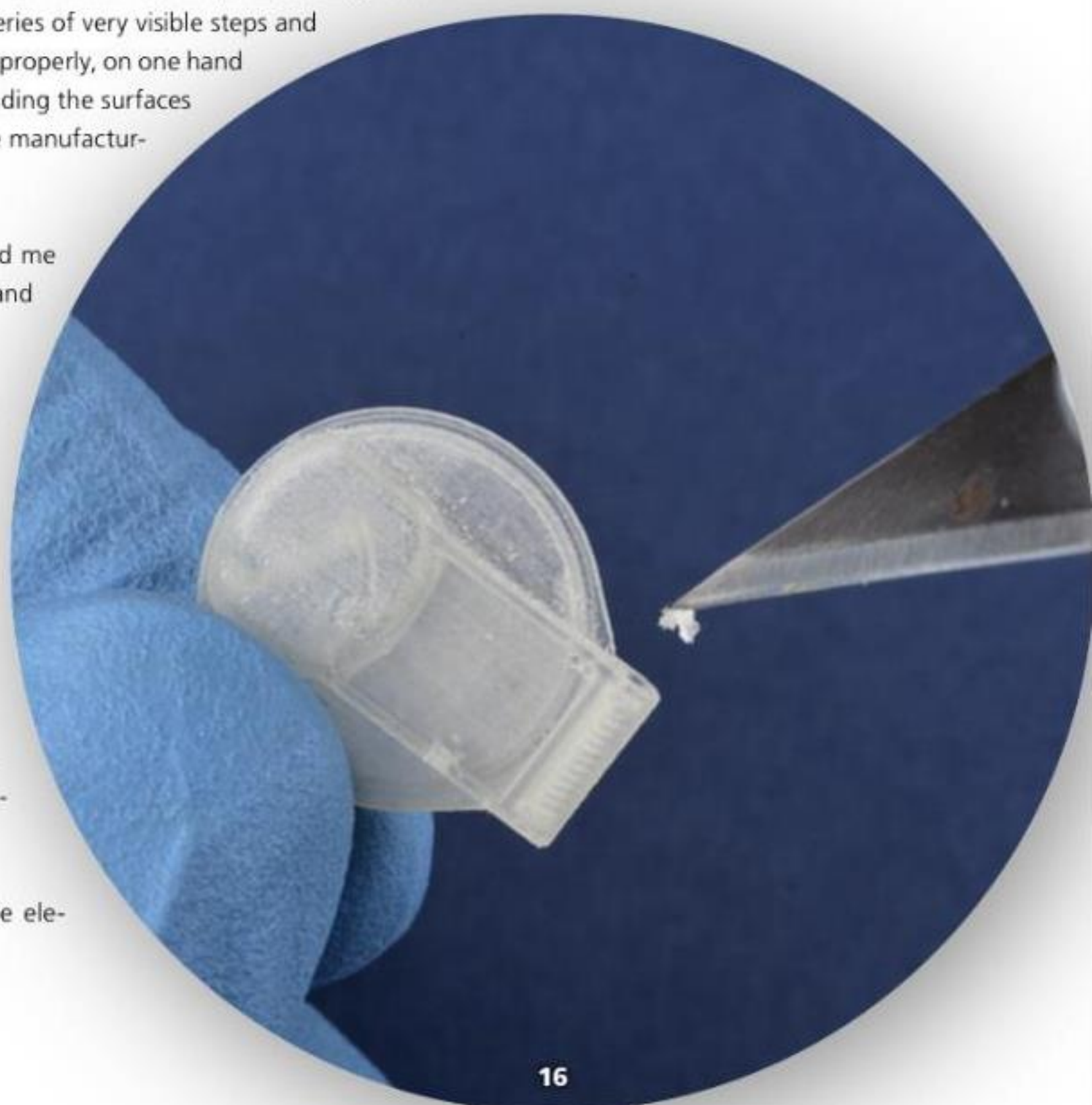
Case C, comes from a plastic sprue, containing the typical runners as well as marks or seams lines due to the union of two sides of the mold and in this case has an ejection pin mark. The piece is clean. **(14,15)**

The removal of the leftover sprue material is not a problem in case B and C, but it is in A. On the other hand, the printing system in A and B leaves a series of very visible steps and generate roughness. Therefore, the piece must be treated properly, on one hand removing the support material and on the other hand sanding the surfaces so that we remove the scratched effect that produces the manufacturing system.

For the treatment of piece A, the support material should be removed first, then place the material in a hot water bath and leave for at least two hours.

Once dry clean with the help of a flat brush with hard bristles and solvent type Lacquer Thinner (RC, Tamiya, Mr. Color, Gaianotes or similar) mainly made of methanol, propanol and some type of acetone. It should be noted, that alcohol (Methanol) as well as Isopropyl, by themselves can remove the support material but react with the polymer that makes up the piece, leaving it white and in some cases, depending on the exposure time, may affect its morphology. The use of both is discouraged. In the tests carried out only the products indicated, and especially Mr. Color Thinner, completely dissolved the support material.

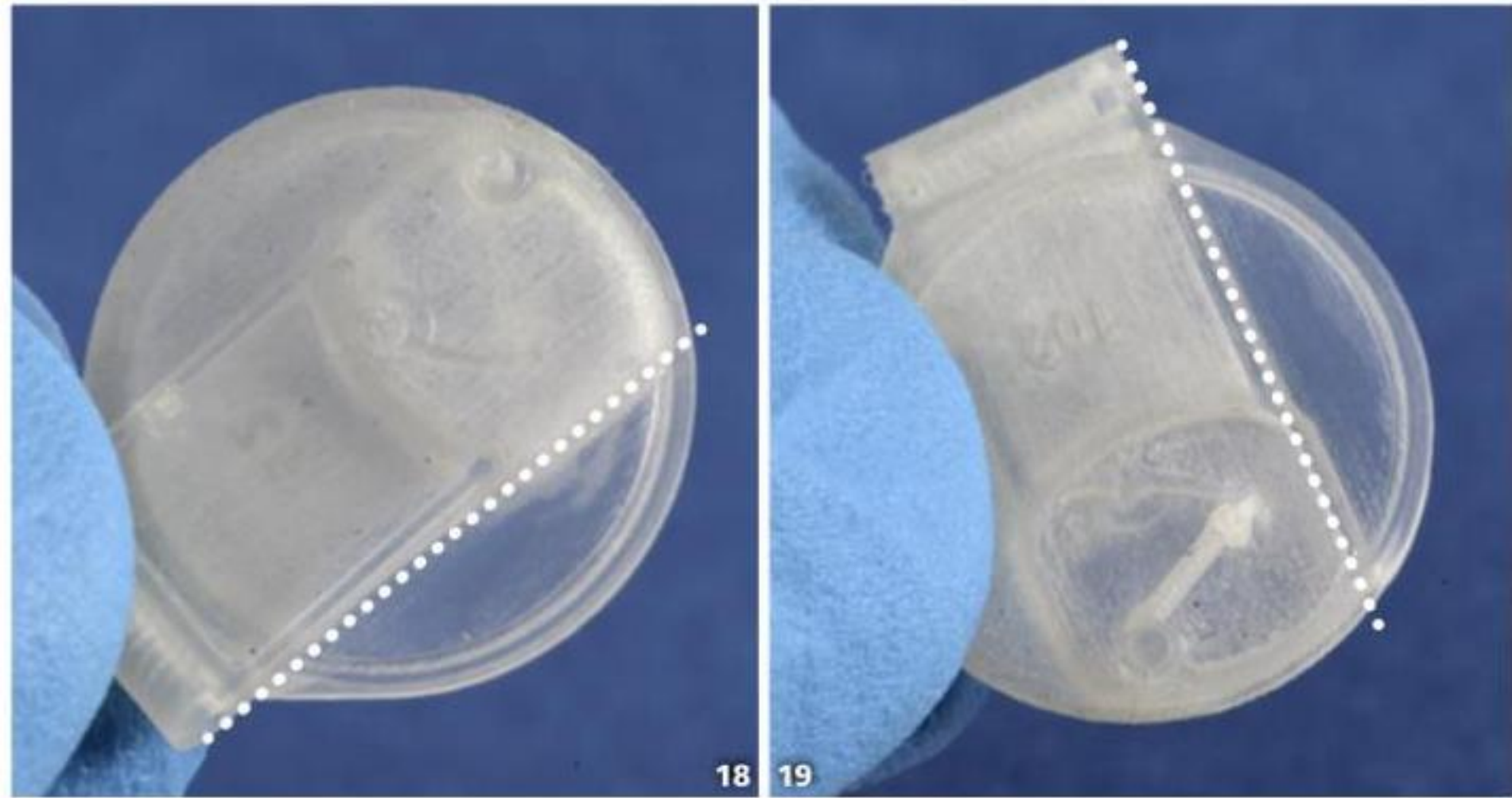
Once clean, it is reintroduced in hot water removing the elements that cover the piece.



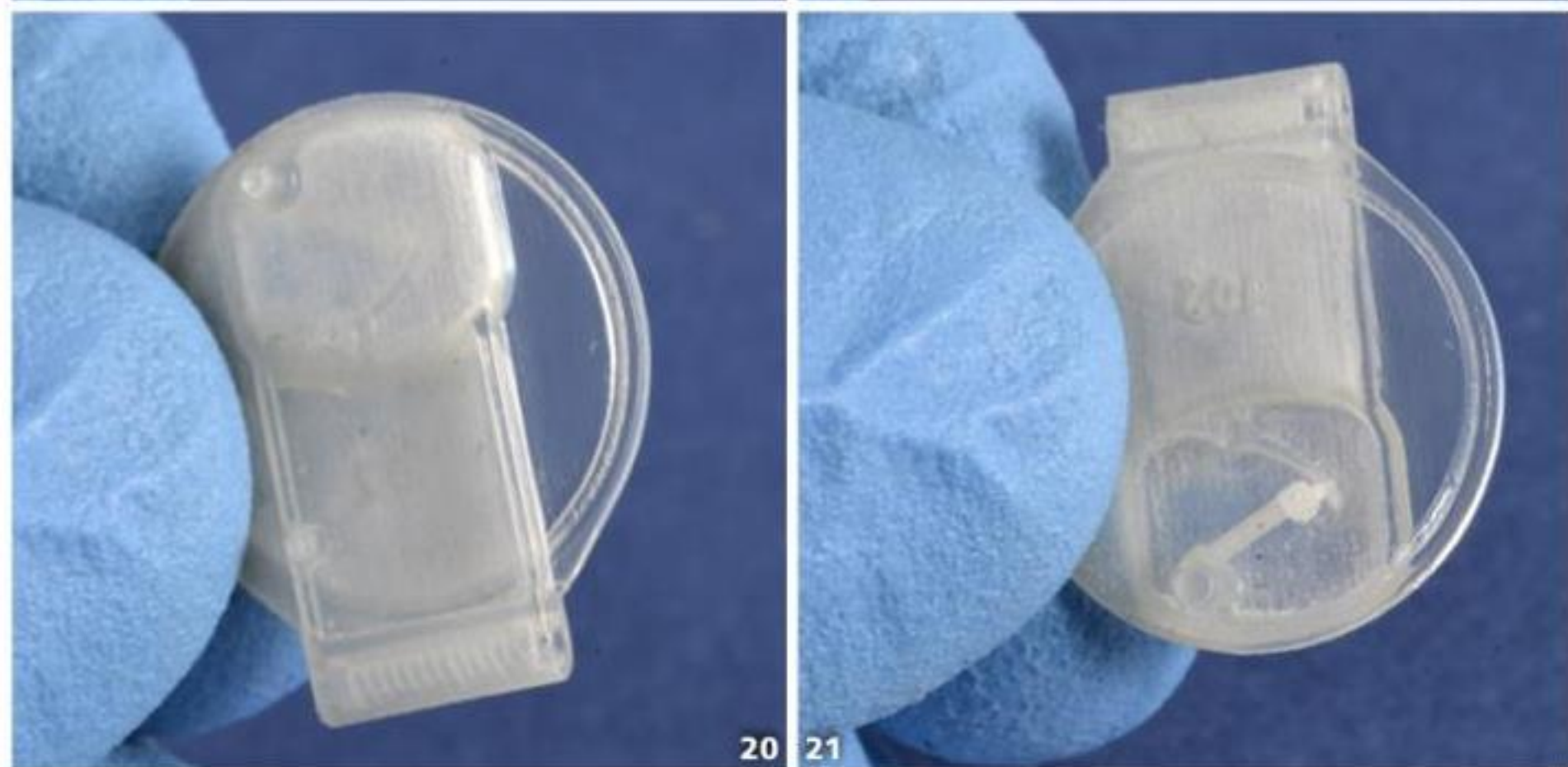
It is time to remove the stripes or steps, so we can use blades or sandpaper of different grain. In our opinion the work method consists on scraping smoothly the piece with a curved blade, perpendicular to the direction of the stripes as far as this is possible, and in the case where more precision is required, we must use those ones that allow us to access to the recesses, these can be of standard shape or manufactured by ourselves from old blades or discarded, with the help of a mini drill.



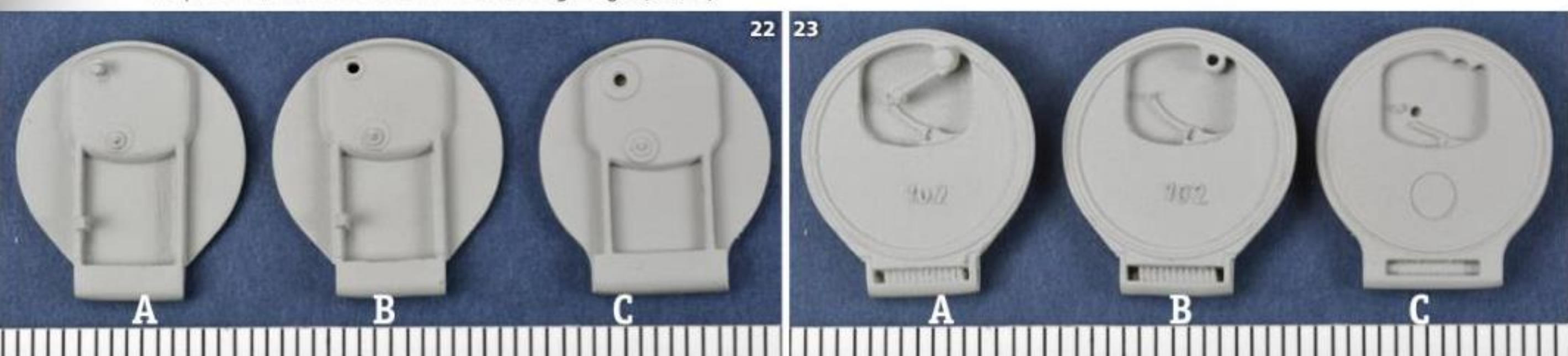
Next, we proceed to polish the surfaces using water sandpaper a grain between 1500 and 2500. After the scraping process if it's hard to see the effectiveness of sanding, the piece can be printed so we primed it with Mr. Surface 1500 or a similar product, that will serve a double purpose: endow of opacity to the piece and on the other hand, show the discontinuities of the material. Once the piece is primed we proceed with a soft sanding, if you remove all the primer most likely the process is finished. **(18,19)**



Finally, we must have a piece of translucent plastic, cleaner, of better quality, and more transparent. In fact, this material can be used as crystals, headlights, or any another type of piece that requires this translucent feature, which can also be enhanced with the use of Gauzy Agent from AK Interactive. **(20,21)**

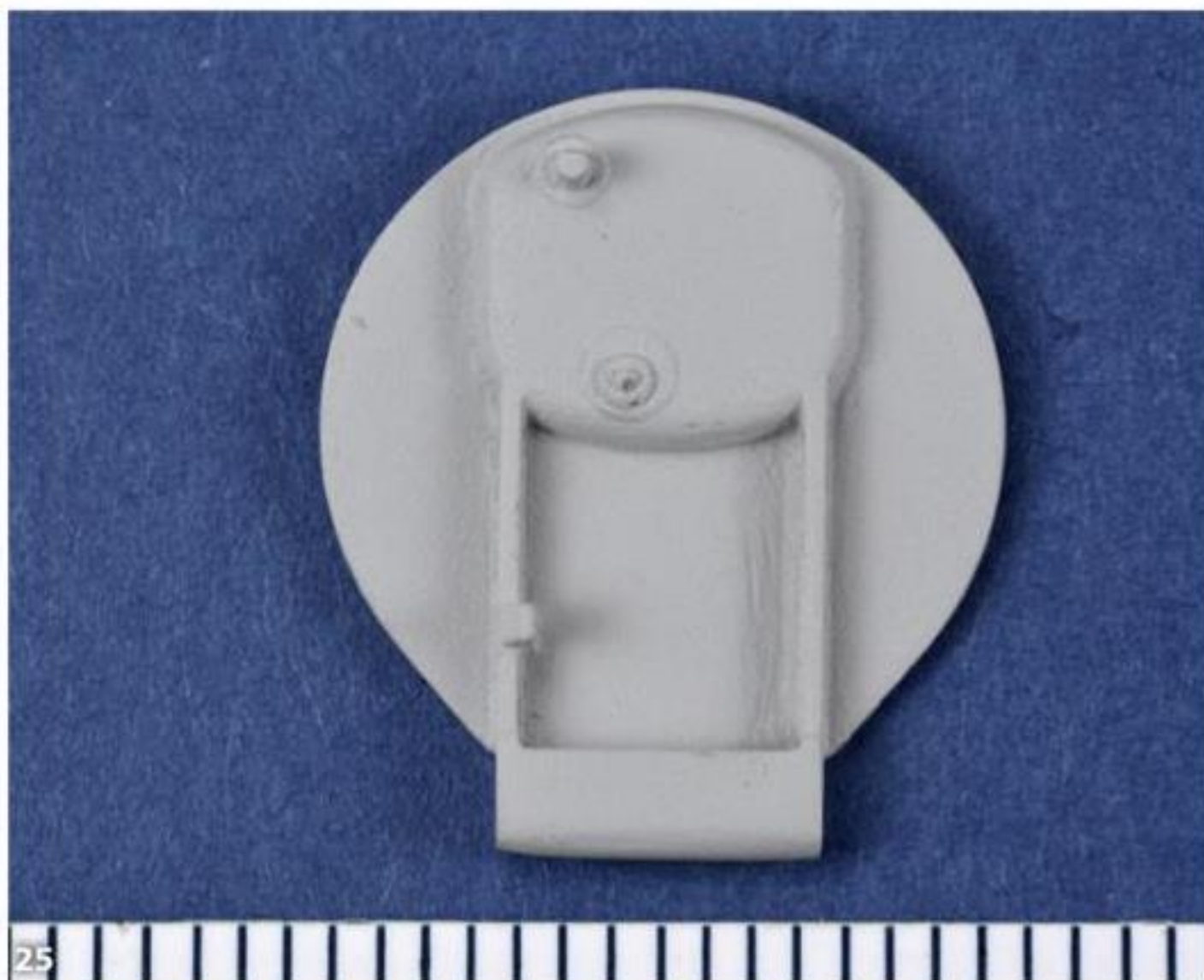


Once we have the pieces ready, we apply a layer of primer, in our case we have used Mr. Surface Gray 1500 covering the whole surface of the piece. The result is shown in the following image. **(22,23)**



Results

Piece A. The surface is smooth, without hardly noticing the manufacturing marks, but we can see how during the post-production process we have lost definition in certain details. In general, the appearance is good, and it is well above the plastic piece C. **(24,25)**



Piece B. This is the one that offers us a higher quality during the whole process, its surfaces are smooth, hardly notice the production marks, the material has color which makes it more attractive and comfortable. We just have to apply some light sanding with 2500 sandpaper to give softness to certain parts. The details remain unchanged. **(26,27)**



Regarding the piece C, the original of the plastic kit has the behavior already known and verified by all the modelers so little can be done commented, even though it is a piece of great quality it lacks the details of a plastic kit.

As we have been able to verify, clearly piece B, reproduced by the system of addition of DLP material and photopolymer type material RCP Nanocure Series generates high quality pieces very appropriate for modeling. In fact, it is the system currently used for the generation of master for subsequent cloning by vacuum casting, especially in the production of figures at different scales. The big problem is the cost, so this method is not operative for the final production of parts for modeling. In the case of piece A, its cost is attractive enough for the manufacture of accessories for plastic kits, but requires a meticulous and heavy post-production work.

Complements and aftermarkets

Once known the different properties of each material we must consider the geometry of the piece to be represented and select the material that best suits its manufacture. This is one of the most important issues when making models and accessories.

Historically the models were only made of plastic (polystyrene), but with the passage of time, as well as the proliferation of different brands of auxiliary products or accessories, known as aftermarkets, these have been introducing different pieces of other materials aimed at a substantial improvement of the own product. In this way, in recent years it is easy to find kits that contain an important range of pieces made with different materials, such as photoetches made of brass, metal barrels in aluminum, resin parts, tracks or vinyl wheels, lead-tin alloys, wood and some others.

But, what is this diversity due to? As we already mentioned, the need arises to represent real objects whose accurate dimensions can be a problem because the properties of the material do not allow it.

Currently, the model revolves around a kit reproduced in plastic manufactured by injection. This process has managed to get at an optimal level of detail, being able to represent almost the entire elements of the real object. The big problem that presents the plastic kit is the minimum thickness of the pieces, being these above 0.4mm or 0.5mm, increasing according to size of the other two dimensions. It also has certain limitations derived from the manufacturing process itself, the mold needs injection points, ejection and the famous moulding lines of the two faces of the mold.

Photoetched parts come to meet the need to represent real elements that are manufactured by metal plates. These plates have small actual thicknesses compared to the size of the piece which implies that once reproduced into scale it can be in many cases under the limit of manufacturing, taking values between 0.05mm and 0.4mm, thicknesses that cannot be reached by the plastic injection technology.

They are very useful, but the manufacturers of these products are erring in excess in the number of pieces, which in many cases do not reproduce the desired piece correctly or the assembly is practically impossible. Perhaps, this generates a general frustration as we are not being able to reproduce certain pieces, or we must spend a lot of time on it not getting the expected result. Which makes a large part of the modelers to turn away from this aftermarket or just make use a small part of the product.

The added benefit given by its own manufacture and the metallic material used in some cases turns against you, since it can not represent objects with non-flat shapes or with three-dimensional differences on the same surface.

Metal turned barrels, usually in aluminum or brass are fantastic, and give to the model a higher value. In some cases, they must

be accompanied by another type of material, usually polyurethane resins, to reproduce certain pieces.

The polyurethane resin supplements are the way to get where the plastic cannot reproduce the detail, or where the process of manufacturing the model increases the costs and makes it inadvisable. The manufacturing process through casting is low cost and very suitable for a low number of copies, which allows having many references without calling for an excessively large investment. On the other hand, it has quality issues, deformations, bubbles and even bad details represented, and manufacturers that offer guarantees are scarce. Despite this, they fulfill a fundamental mission, supplying our models of different pieces not included in the kit or that lack quality.

Individual tracks link can be manufactured in plastic, resin or white metal, replacing those usually included in the lower quality kits. They are very realistic and of great quality, in some cases, the manufacturers of plastic kits incorporate them as a few more pieces, although in recent years, they are being sold separately, perhaps in a search to reduce costs in the main kit and with a view to having another reference which can also help to complement old kits of the same or another brand.

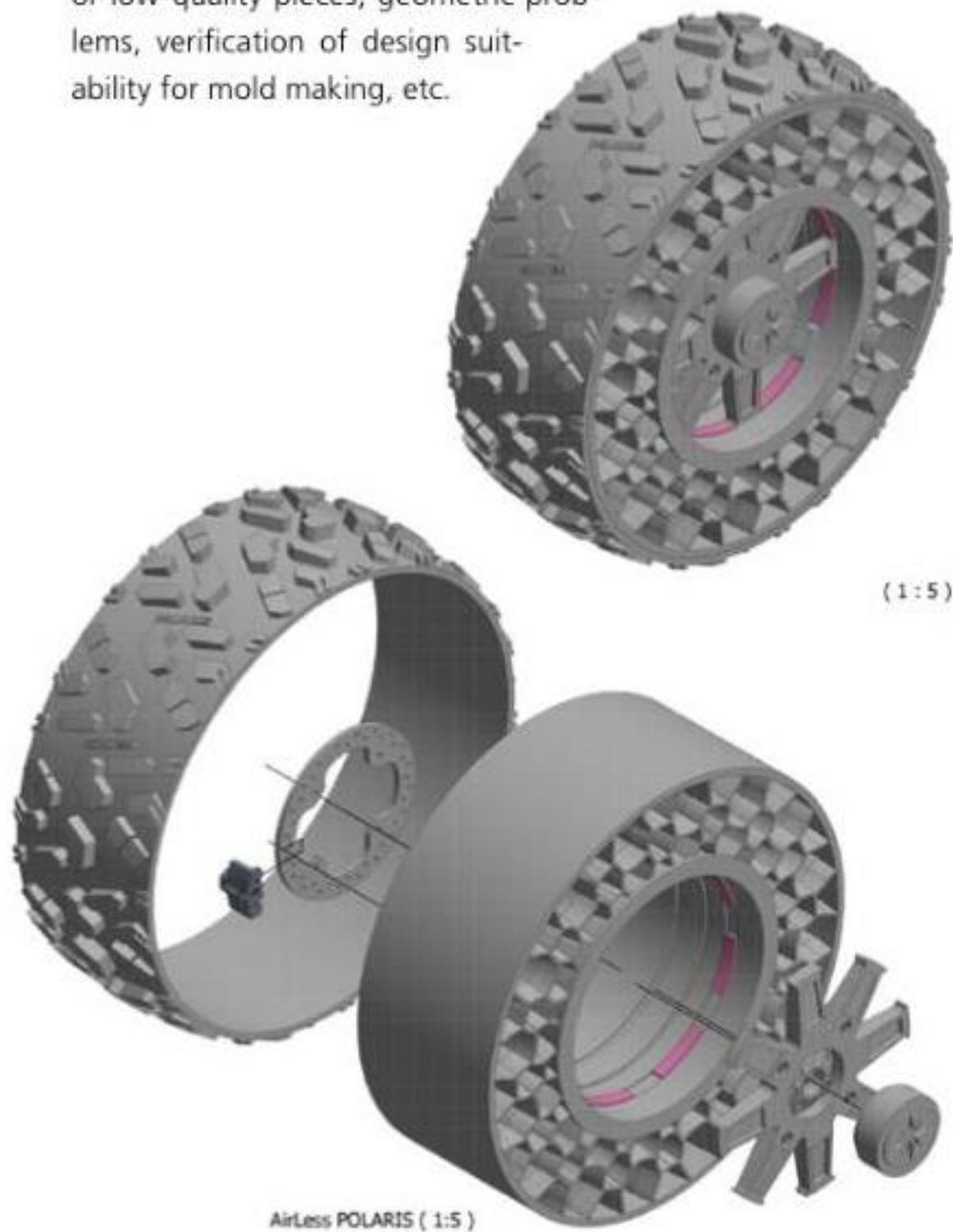
Finally, there are a series of materials and products that usually accompany previous ones, they are usually elements such as laces, steel cables, glass or transparent plastic elements, threads of copper or brass, wooden blocks or any other complement needed to build a specific model.

Within this scenario, where can we place the materials obtained through 3d printing? Certainly, the most interesting is to be able to determine which or which are the applications for this new technique.



How to make a prototype

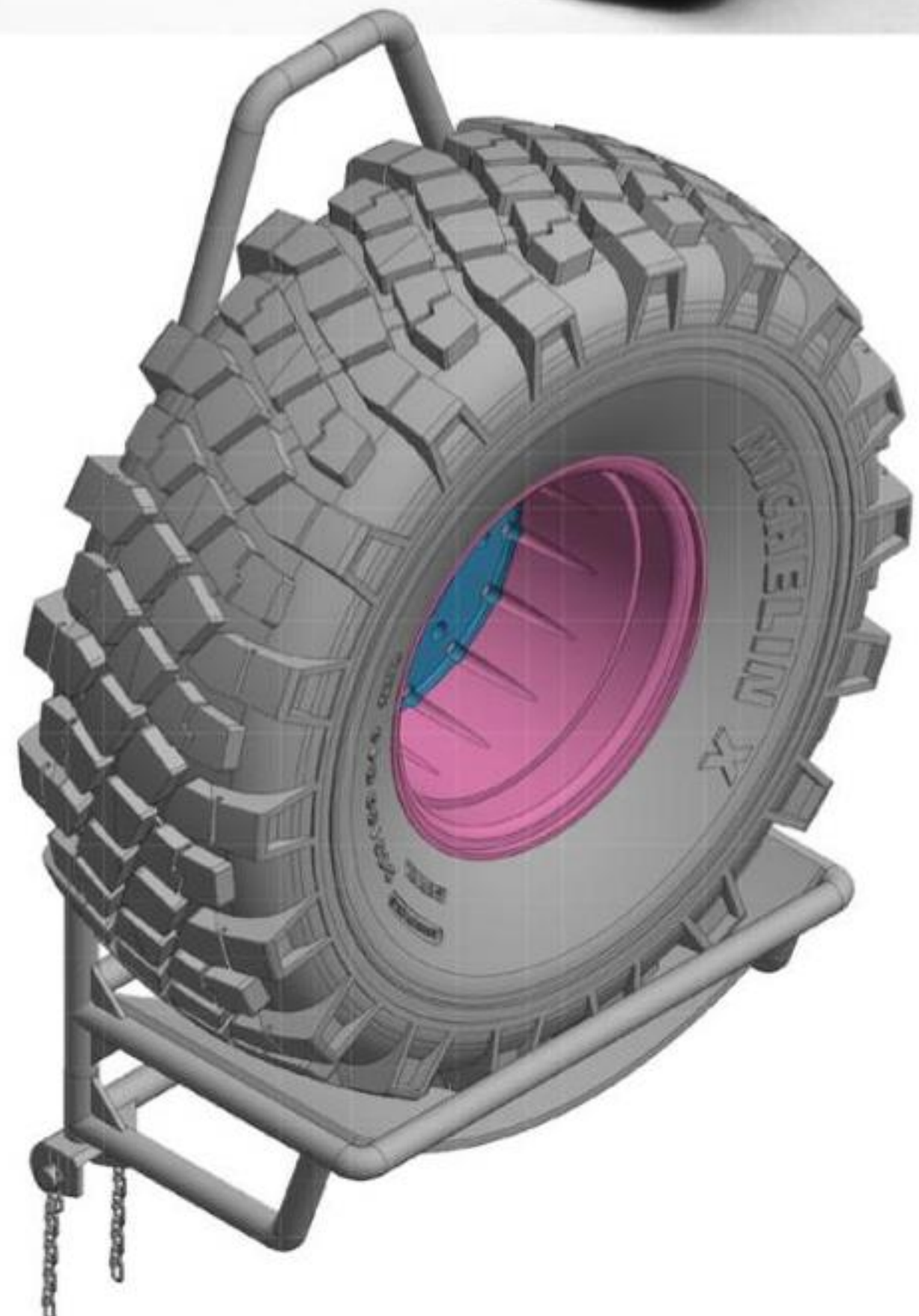
It allows manufacturers of other types of products, mainly plastic kits, to have a previous model as it should come out of the injection molds and allow its quality department to test the fitting to verify the correct assembly of the pieces, possible design errors, unrealistic or low-quality pieces, geometric problems, verification of design suitability for mold making, etc.



How to make a master

Undoubtedly, the manufacture of masters by resin casting for duplication is a plus. As we have seen, the quality achieved, its ease and cleanliness, together with the fact of the evolution in the specific computer systems marks a turning point for this technology.

We must emphasize that for this part of the sector, the manufacturing cost of the master has been reduced significantly, and not only the cost of the printing of the piece, but because they now control more adequately the design for its manufacture, the placement of the pieces in the sprue and ejectors, stamping their own signature, making availability to make the master without risk or damage, and at all times, thanks to the format where it is located, the possible modifications that were necessary in case of errors or any other type of circumstance that may occur during the production process. The same way, and thanks to advances in procurement techniques of geometric information, commonly known as three-dimensional scans, allows the manufacturer the possibility of digitizing, improve and re-produce references that had become obsolete, broken and/or damaged.



Manufacturing of final pieces

Perhaps it is the less exploited part and possibly the one with an important future. This will depend on the reduction in the cost of machinery and materials, still in the process of evolution and excessively corseted by patents.

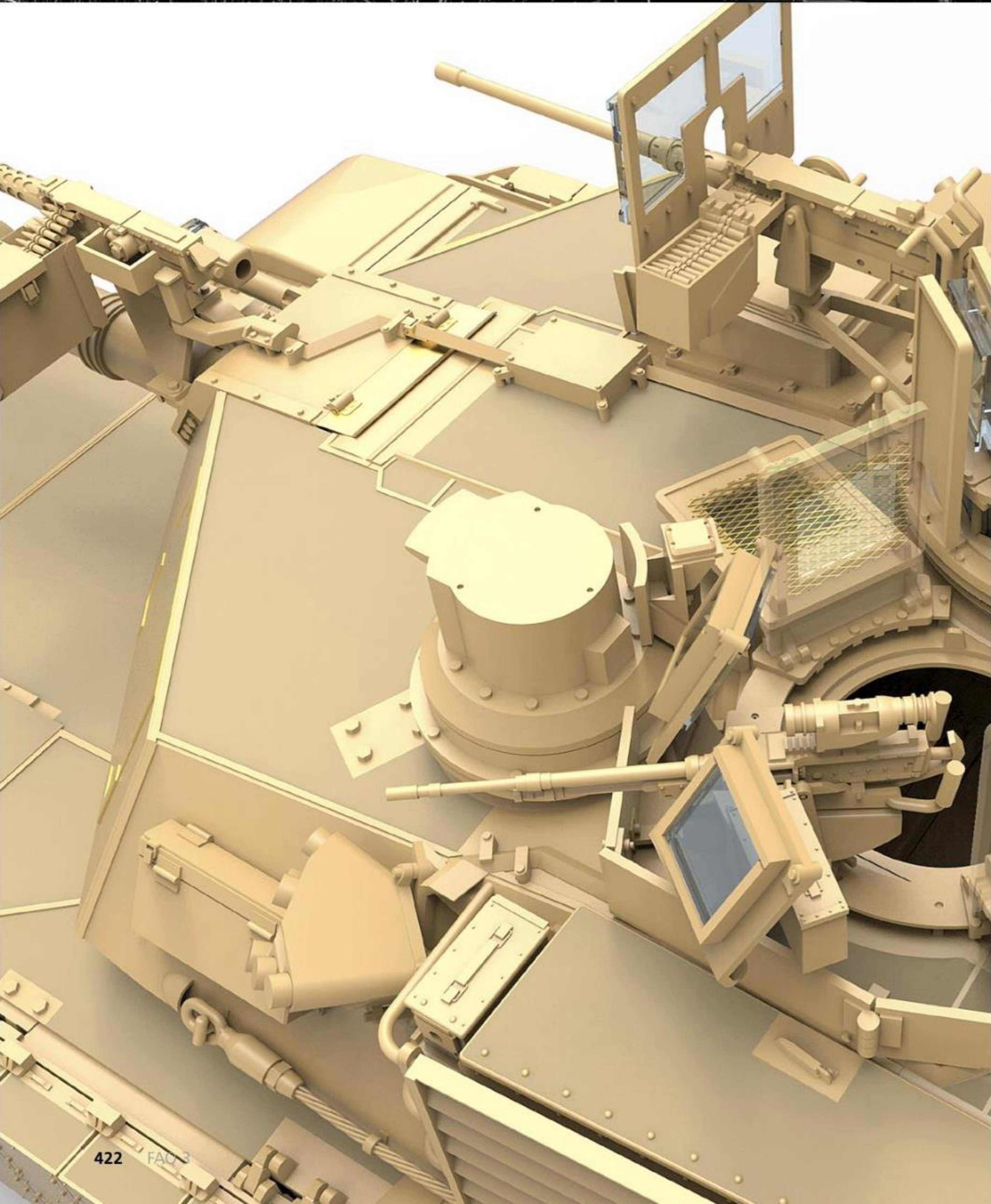
It will hardly be able to compete with the plastic kits for the economics of this system, but it will compete in the accessories sector and the figures.

Its main advantages will be the high reproduction quality, the dimensional stability, the possibility of improvement, its exclusivity and the difficulty that will represent the distribution of replicas, since they will equalize manufacturing systems. Faced with own disadvantages of the digital world, the loss or theft of the data file supposes the failure of the reference in the distribution system, all the world will have it and therefore there will be no need to buy, and in this same line, the advance of the scanning techniques will allow the cloning of the pieces quickly, easily and accurately.

We can say that practically any piece or three-dimensional product applied in modeling can be reproduced with techniques of adding material, from the complete kits, to the accessories. Currently as we have commented the costs don't allow it, but the technology is there, the materials also and opens a world of possible improvements, such as the manufacture of mobile pieces, models reproduced from one or a few pieces, especially in small scales, new levels of detail, custom pieces and customized... and many other ideas that are still to come.



IV. THE FUTURE OF MODELLING



CHAP.: 2

Detailing a plastic kit with 3D parts

When it comes to immersing yourself in the project of superdetailing, methodology becomes less important than the desired results. We must consider key aspects for guaranteed results, both for ourselves and for others.

If the selected methodology is based on 3D printing, these aspects have a much greater relevance.



The vehicle chosen as an example is the Spanish AMX30E2 tank and the main reasons are:

- Access to the real vehicle located in the exhibition of the Castillejos II Brigade in Zaragoza.
- There are a couple of MENG model references, the AMX-30B (Ref. TS-003) and AMX-30B2 (Ref. TS- 013).
- There is no kit available on the market for the Spanish version.
- The number of parts is not too large.
- There are aftermarket materials for this model, such as photo-etch, metal barrels and tracks, which simplifies the work.

- The vehicle has been active for a long time and there is a lot of photographic reference material.

The differences between the French AMX30B model and the AMX30E2 are the result of the modernization plan of the Spanish Army, which consisted of the modification and adaptation of various elements such as the engine, secondary armament, targeting system, etc. We will focus on the external differences since, after all, they are the ones which will be visible on the scale model. The design changes are:

Chassis:

- Repositioning of front light equipment, mainly the combat light that is repositioned.
- Change in the location of the fire extinguishers.
- Incorporation of side skirts for undercarriage protection, including an adaptation of the front and rear fenders.
- Addition of an antenna holder in one of the laterals.
- Change of exhausts and the protection grills that cover them.
- Change of rear phone.
- Complete replacement of engine cover as well as the protection grill.

Turret:

- An MG-3 (MG-153A, 7.62mm) was used instead of the original machine gun, with a new bracket and guide focus.
- Incorporation of the targeting system MK9 A / D, laser range finder and thermal camera.
- Modification of the loader's hatch and introduction of a bracket for the close support weapon, in this case a Browning M2HB cal.50 (12.70mm).
- Incorporation of Wegmann-type smoke dischargers, two pairs of four units at different angles.
- Substitution and addition of antenna bases and an instrument for lateral wind measurement.
- As well as the sealing and adaptation of the different parts of the turret to the new built-in equipment and elimination of the originals.



Materials available on the market

The available options that the modeling market offers us must always be assessed. In the case of the AMX-30, as mentioned before, we have four kits, two from MENG (AMX-30B Ref. TS-003 and AMX-30B2 Ref. TS-013) and two from HELLER (AMX-30B Ref. 81137 and AMX-30B2 Ref. 81157), and a fifth from Tiger Model (AMX-30B2 Brennus Ref. 4604).

The available aftermarket products are:

Tracks

There are the ones provided in the kit, workable tracks from Meng, in plastic. Heller also has an individual track link set. Metal tracks come from Friul (Atl-115) and Spade Ace Models (SAT-35179).

Metal gun barrels

Available items: Orange Hobby (Ref. G35-112), LionMarc (Ref. LM10048), Magic Models (Ref. MM35151), Barrel Depot (Ref. BD35020), Voyager Model (Ref. VBS0172), ABER (Ref. 35L-141) also the one included in the kit.

Photoetches

We can also find various PE options. Vogayer offers a couple of references (Ref. PE-35549 and PE35730), Tetra Models Works (Ref. ME-35028 and ME-35029), and Eduard (Ref. ED-35221) for Heller kit.

Auxiliary weapons

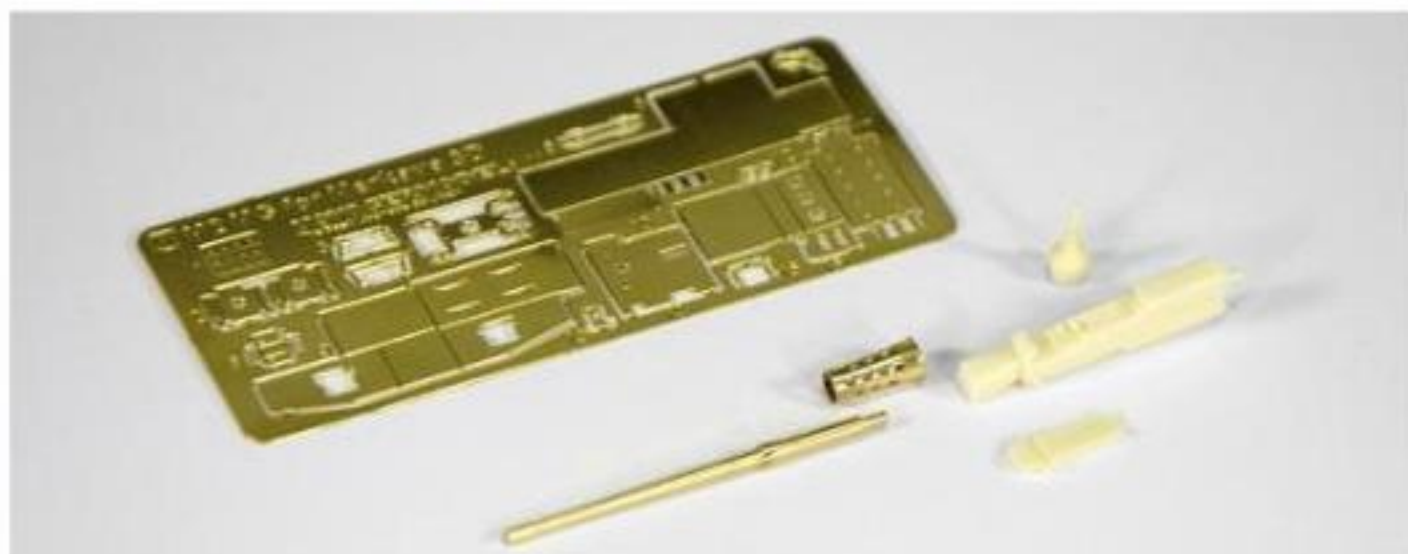
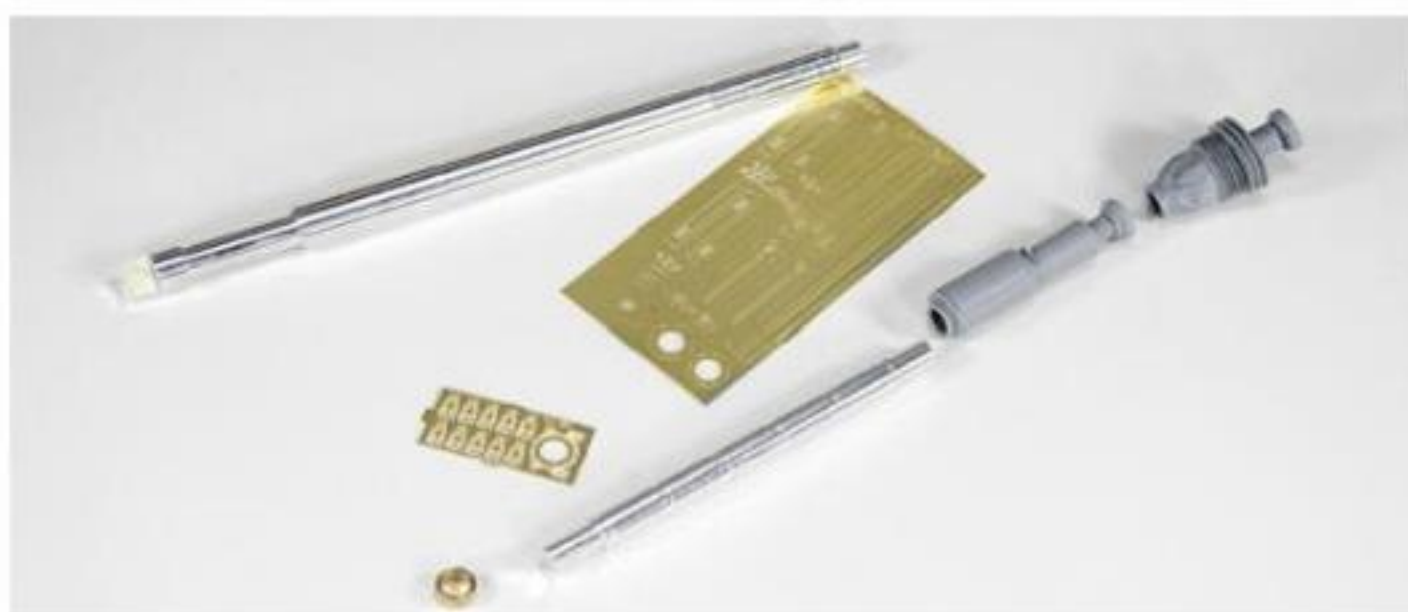
The MG-3 can be found in different plastic kits with different degrees of detail. There are also some kits in resin, such as Perfect Scale Modellbau (Ref. 35032 and Ref. 35165), as well as different possibilities provided by 3D printing. The Browning Cal. 50 is easy to find in plastic, resin, combined with metal barrels and photo-etch parts, and 3D prints. We can recommend brands such as LiveResin, AFV Club, Voyager, K59, Aber, Asuka, among many others.

Lenses and headlights

SKP Models (Ref. 226) and Voyager Models (Ref. BR-35030).

Others

Some brands have aftermarket products available, such as Azimut (Ref. 81124), towing cables, decals, camouflage templates, etc.



Used materials

As mentioned before, the base kit used for the AMX30E2 is the Meng AMX-30B2 (Ref. TS-013).

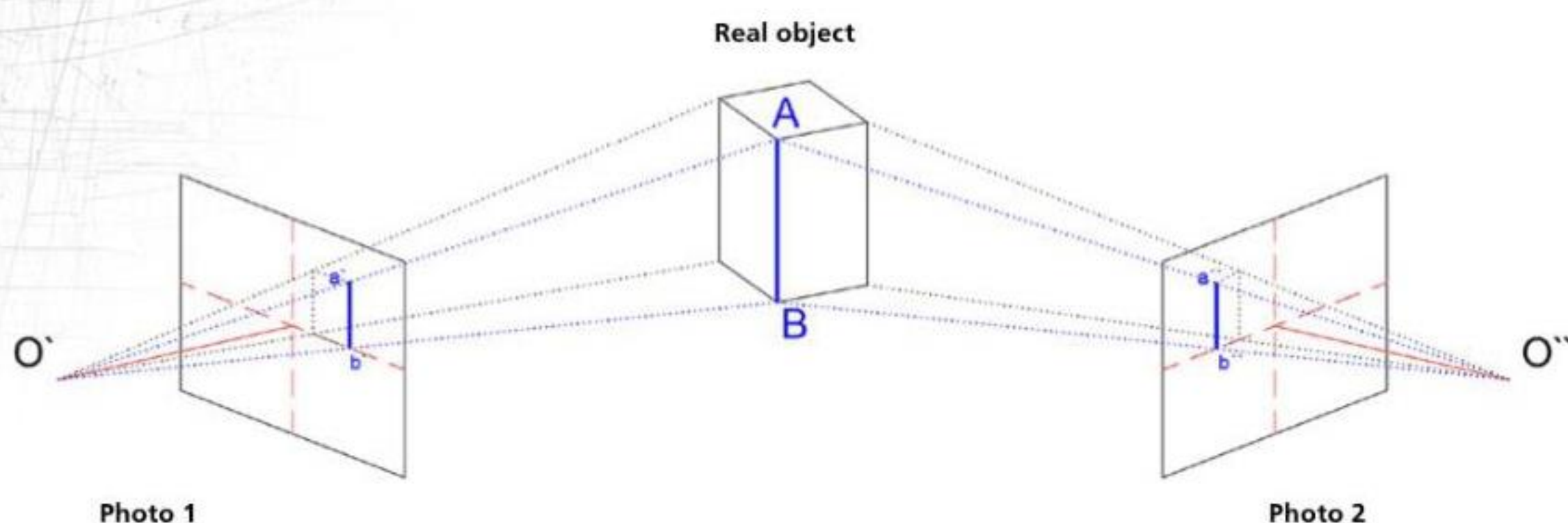
Regarding the aftermarket items, only the Orange Hobby turned metal barrel (Ref. G35-112) is used, since the tracks we use are the ones provided in the kit. The MG-3 from Perfect Scale Modellbau and the Browning from K59 are used as auxiliary weapons. The lenses and headlights are those from SKP Models.

Measuring the real vehicle

To carry out the design of the different parts required for the AMX30E2, there are two possibilities. Either we have the real manufacturing plans, or we do it by measuring a real vehicle. In this case, we only obtained the information from the real vehicle. The example vehicle is located in the exhibition of armoured vehicles of the Cavalry Brigade Castillejos II in Zaragoza.

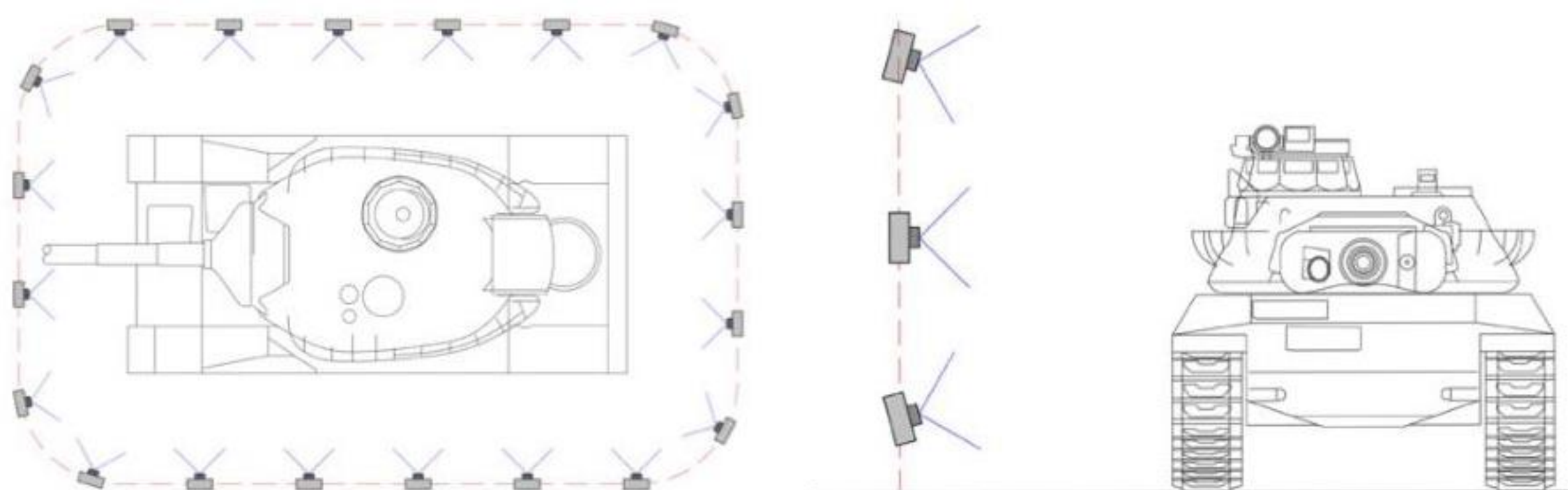
For carrying out the measurements, direct measurement techniques were chosen for scanning by close object photogrammetry. This is a low-cost technique of indirect measurement that consists of obtaining the 3D geometry of the object by taking multiple pictures of said object.

The system is based on the capacity of measuring on the basis of two or more photographs in which the same point is present. Complex mathematical models are used to obtain the 3D coordinates (x, y, z) of the observed point.



As in all processes, there are factors that determine the quality of the results obtained such as the quality of the camera used, the lighting or the way of taking the snapshot, among others.

The field work consists in the photographic acquisition of the element to be represented, for which the necessary photographs are taken in the best possible conditions.



One of the important aspects within photogrammetry is the possibility of identifying in a very precise way common points in the different images. This can be done by identifying characteristic points of the object that are called natural targets, or by the addition of prefabricated targets that are attached to the object. In this case prefabricated coded targets were placed along the vehicle, placing them in strategic places, with good visibility and in different areas.



In the image we can see how these targets are perfectly visible and identifiable. Thanks to the circular codification the software is able to read them and autonomously relate them between different images.



We can also help with direct measurements made with a flexometer. That allows us to have a validation of data obtained by photogrammetry.

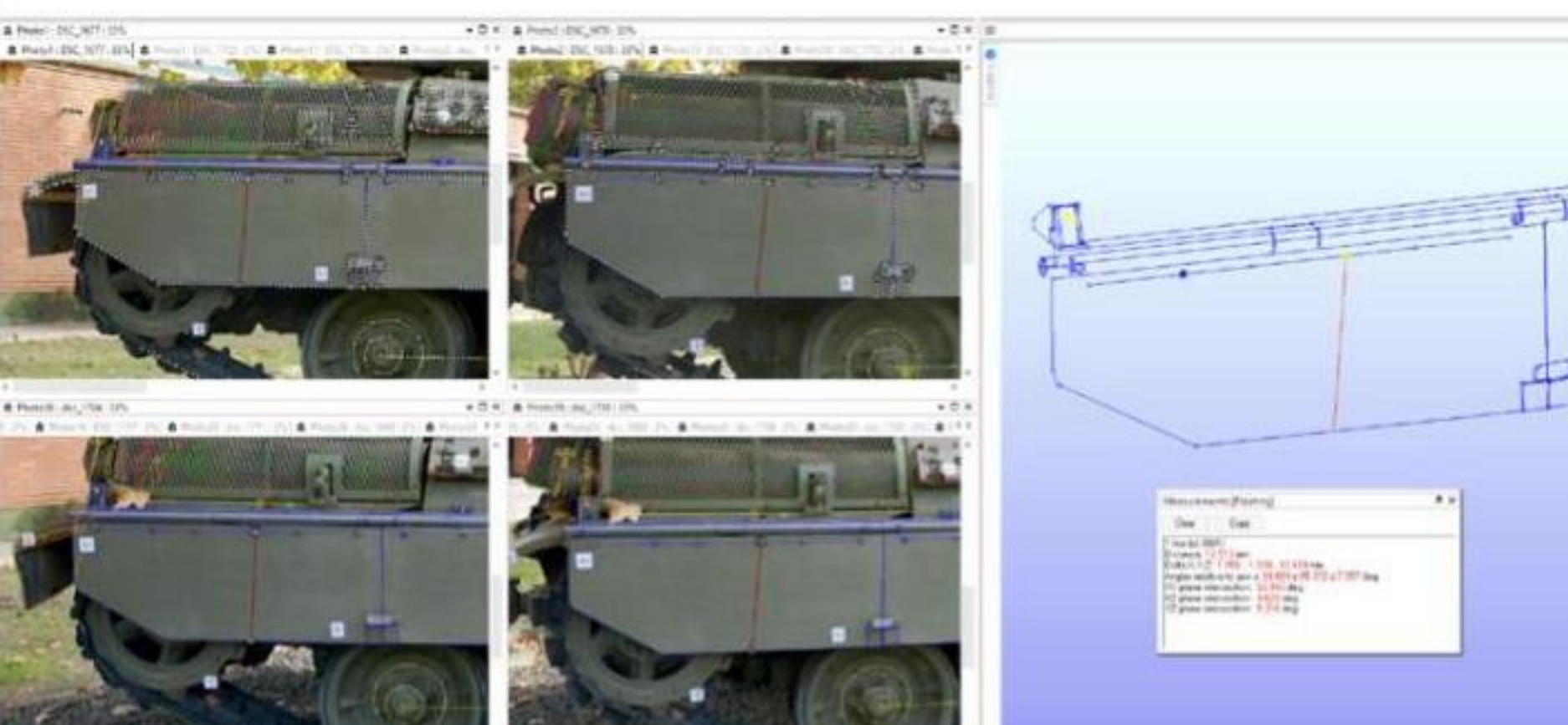
Once the measurements are made, the different calculations within the computer program run. In the following images we present the data obtained from the scan.



The scan produces a cloud of points that represents the work object.

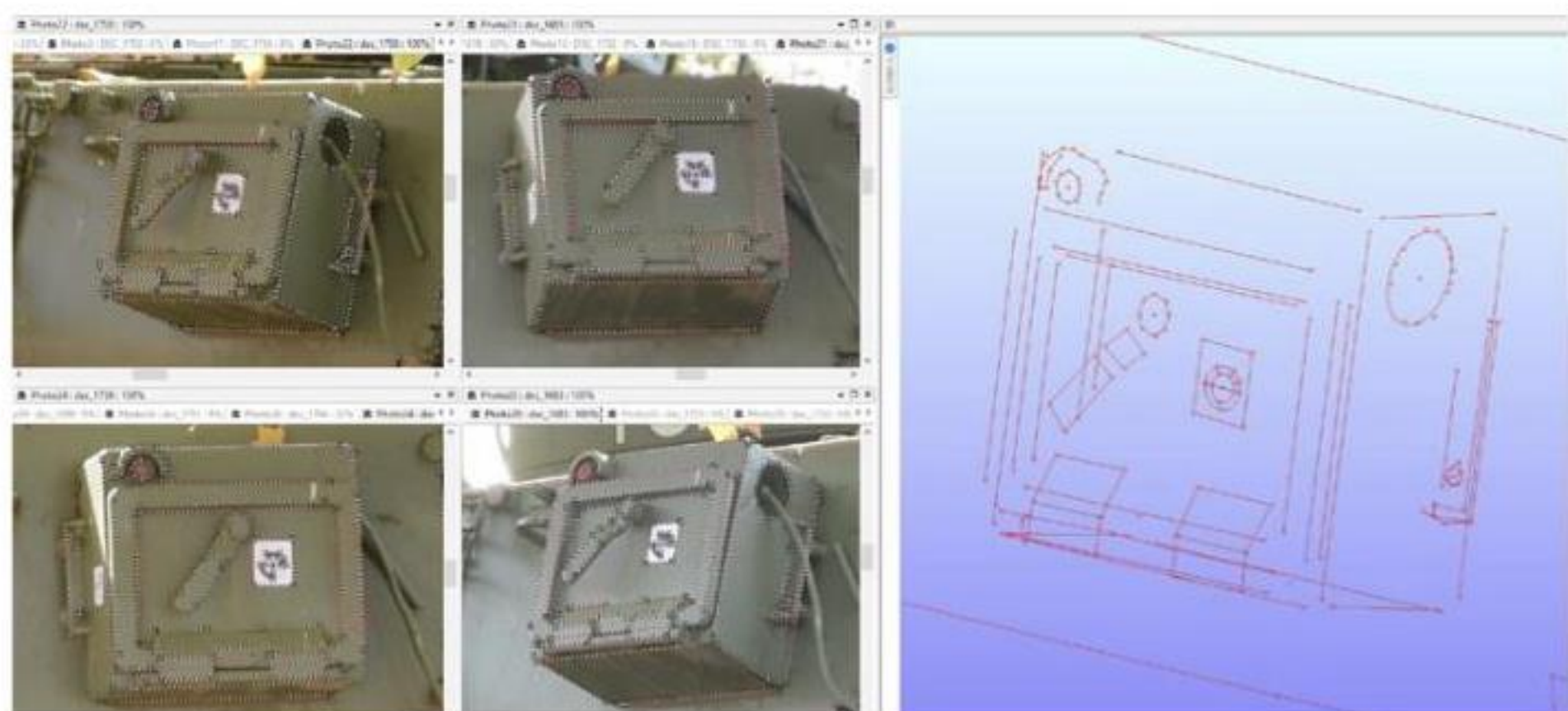


Data collection by direct measurement with the help of a flexometer.

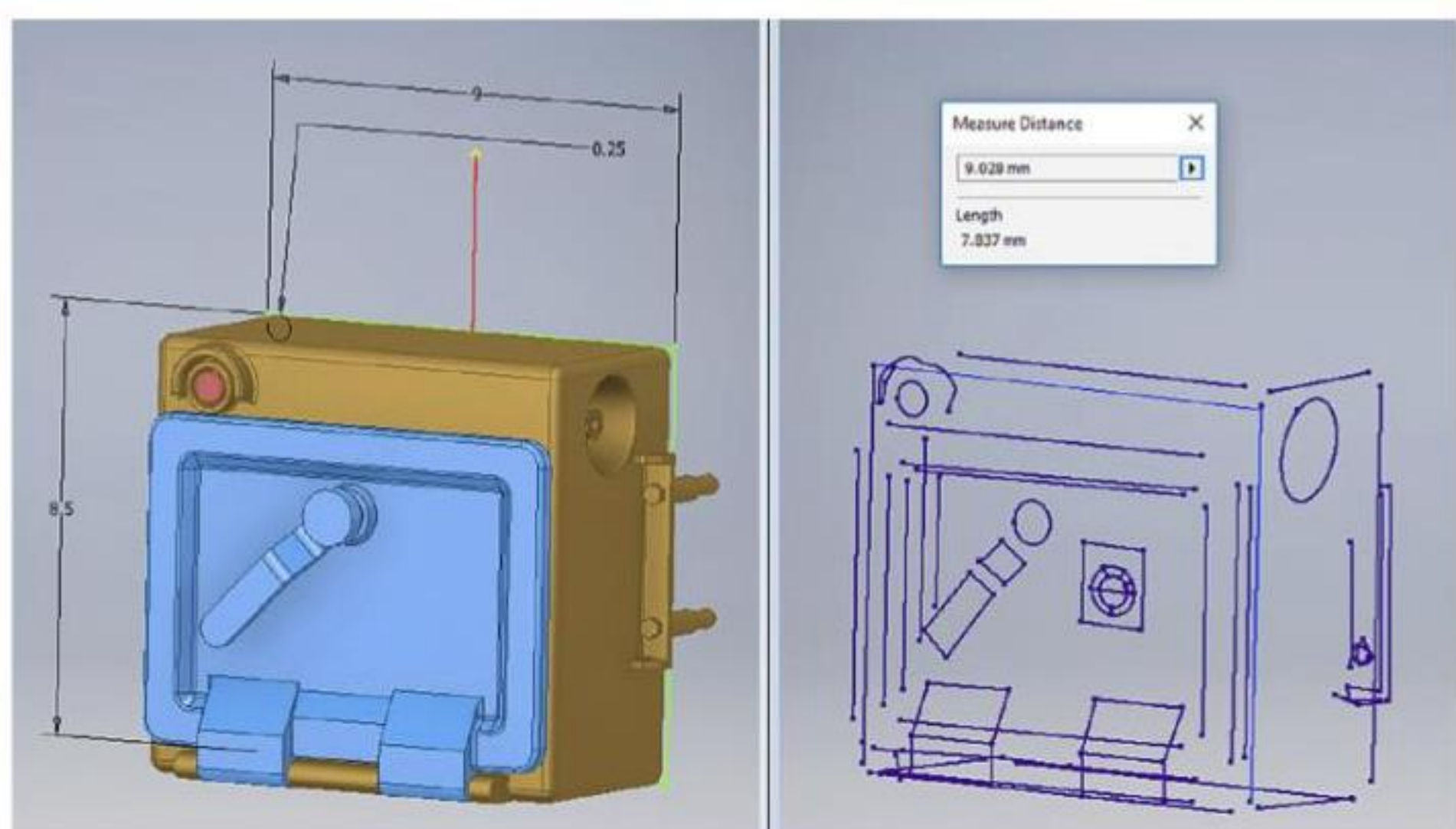


This image shows the right side skirt in the software program. The model calculation has already been determined in 1/35 scale in order to simplify the measurements.

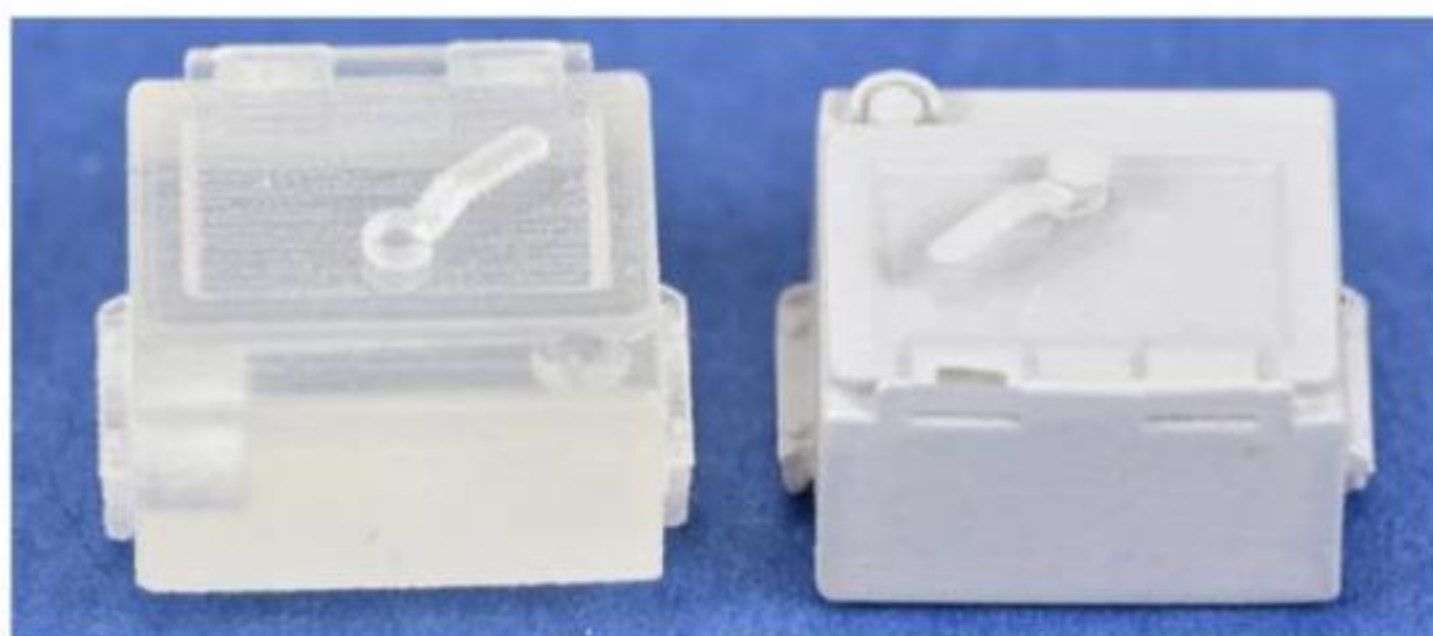
From now on the work will focus on the three-dimensional design in a suitable software program in order to get the 3D part that should be adjusted to the plastic kit.



Once we start working in the 3D design program we import the different points and lines obtained through the photogrammetric software and we start defining the geometry.



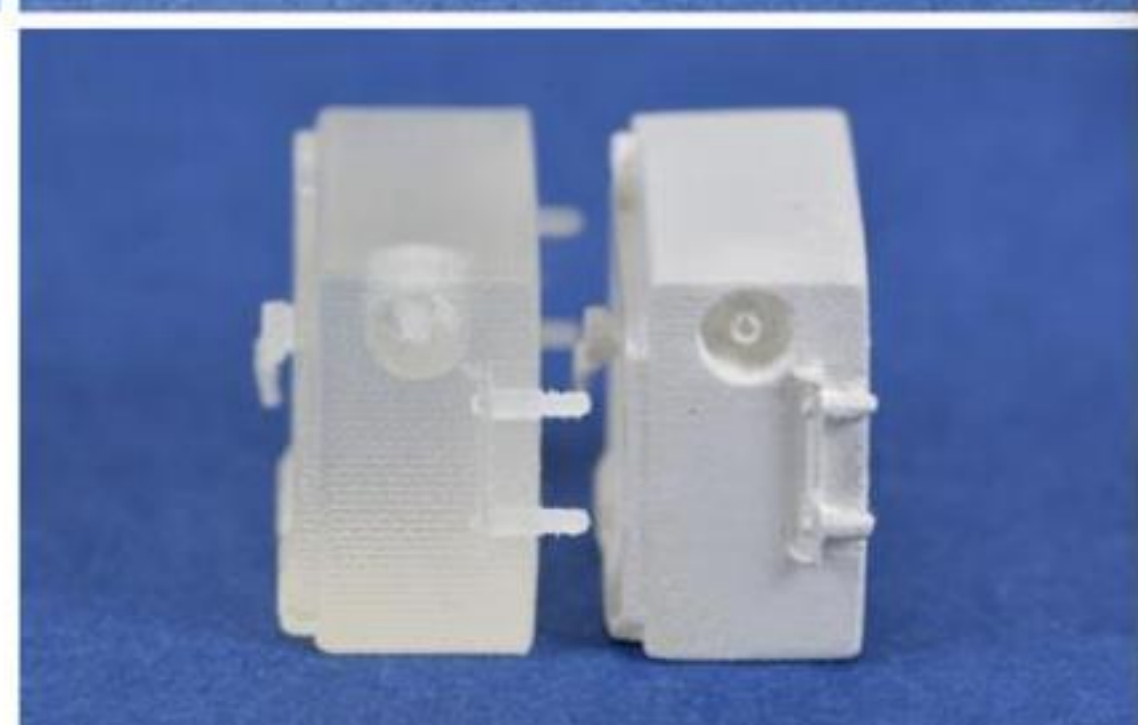
Finally the design is exported to an STL file (Standard Triangle Language) necessary to communicate with the 3D printing machines, or Addition of Material (AM). Depending on the characteristics of the machine and material used we will obtain the desired piece.



For printing the pieces, Multi-Jet (Polyjet) technology is used in the Projet 3500HDMax machine from the 3D System brand. The material used is Visijet @ M3 Crystal with a resolution of 16 microns. The subsequent treatment of the parts is the same as the one already described for cleaning, polishing and smoothing the surface.

The part is primed with gray Mr. Surfacer 1500.

We have just created a conversion element thanks to 3D technology. We have proven we can improve models in a digital way!



Building the Meng kit

We will show the assembly of the plastic model kit, the different aftermarket products and the parts designed and printed in 3D. In general, the MENG model ref. TS013 is impressive in terms of dimensions and assembly. The plastic is nice and easy to manipulate so it does not present any construction difficulties. Just like any other kit there are small things that can be improved, but in general it is a very correct model.

Basic structure



Assembly of the lower part with the complete running gear. The joints are easy and the fit is perfect. There are no deformations or inadequate parts. The interior must be painted white and black to avoid that in the end you see the colour of the plastic. The different holes must also be sealed and some welds should be added.

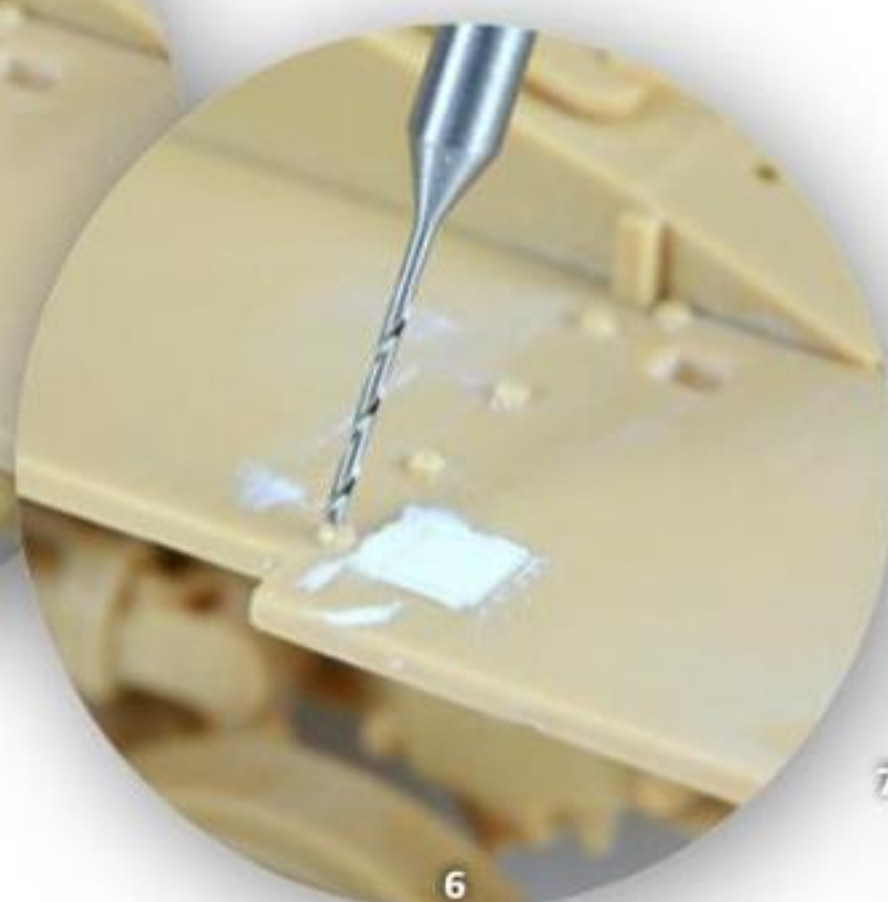
Building the turret is a breeze.



(3,4). The excess parts are eliminated. Later these spots are filled with plastic and putty. Finally with sandpaper of different grit and some water the area is polished to leave the surface completely clean, smooth and without imperfections.

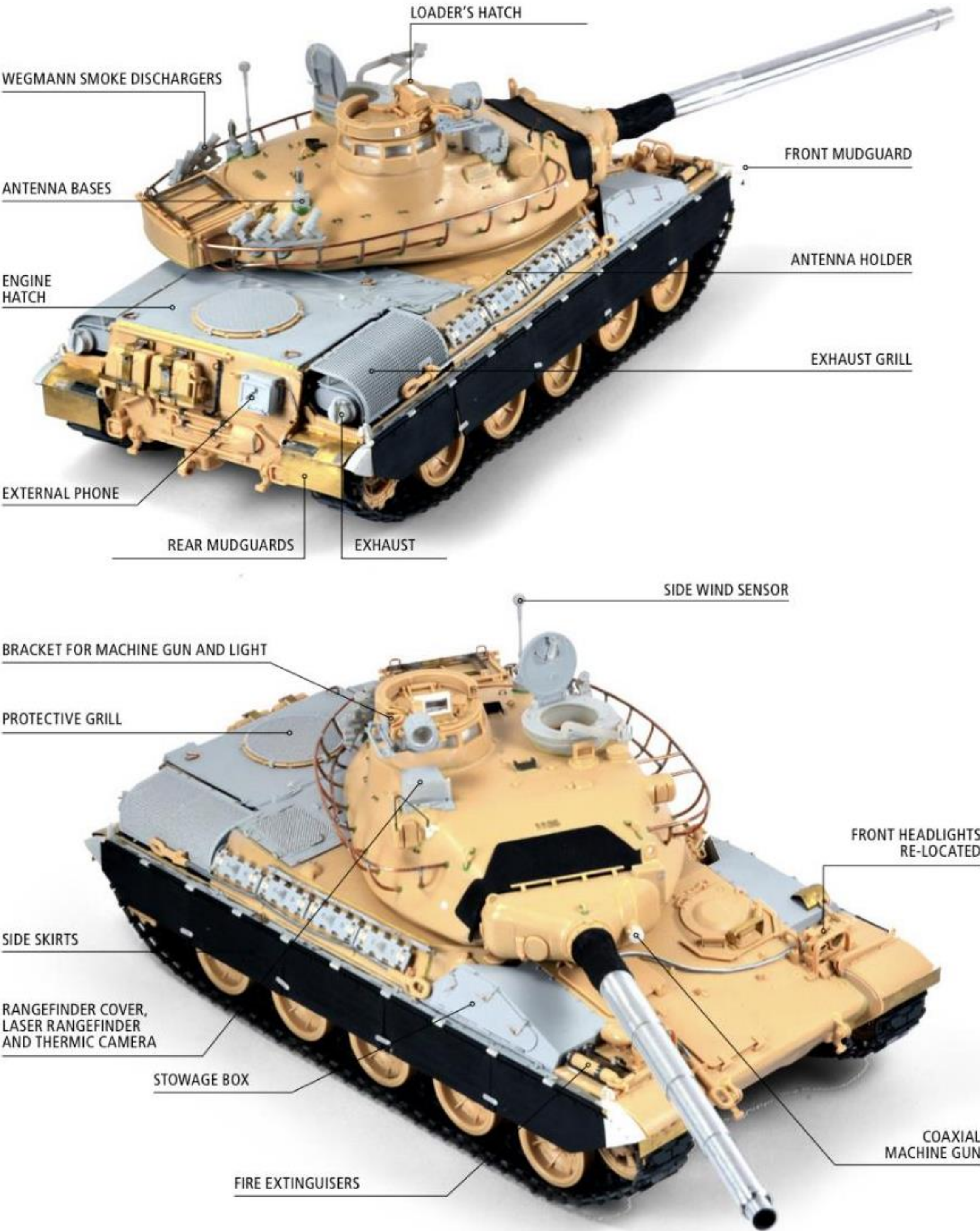
(5,6). Nuts are replaced, making new holes with the help of the punch and mini-drill.

(7). In the image we see the result: all holes covered, areas removed and sealed and new nuts in place. The nuts used are from Masterclub. They are high quality and simple to use.



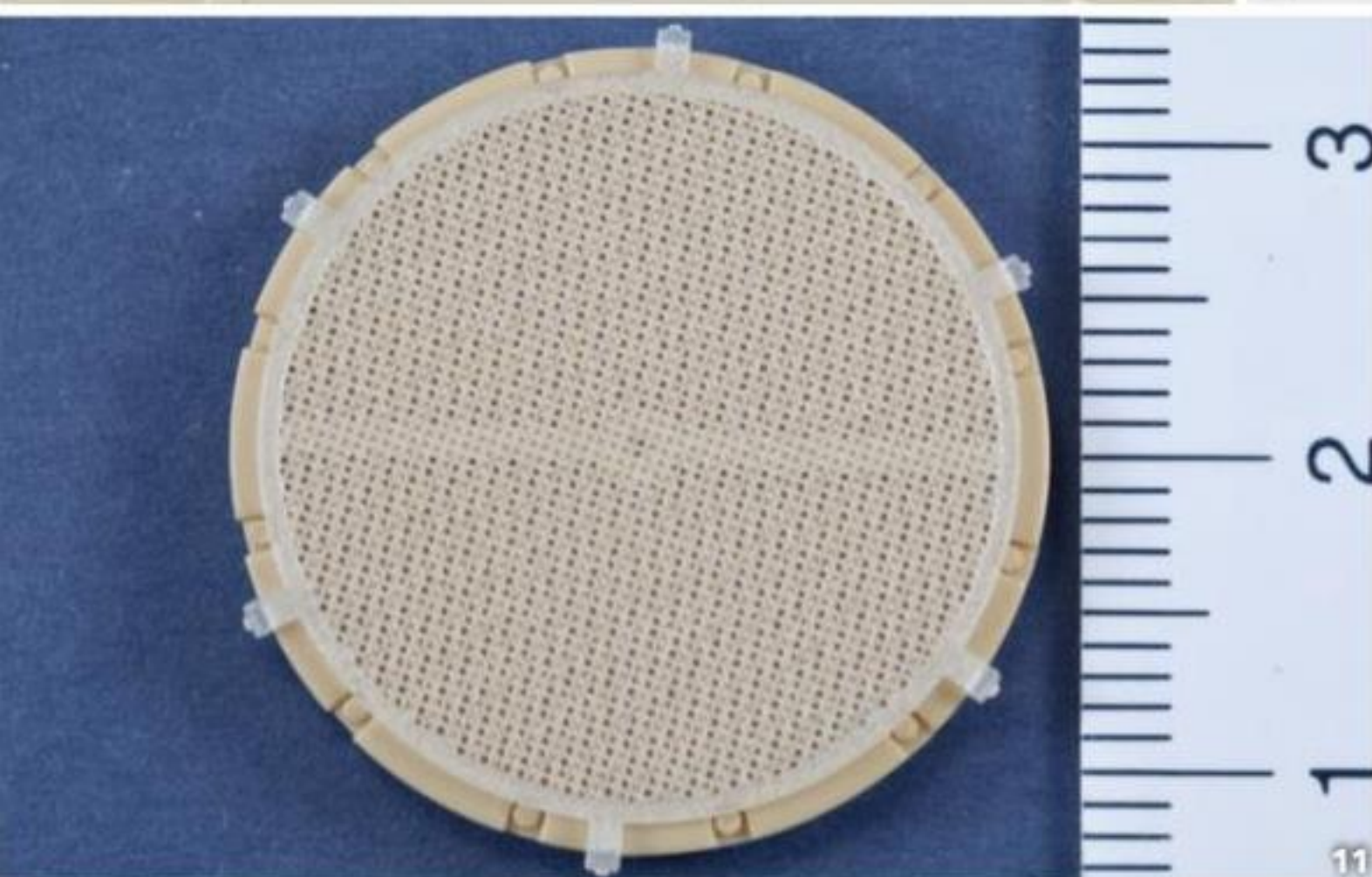
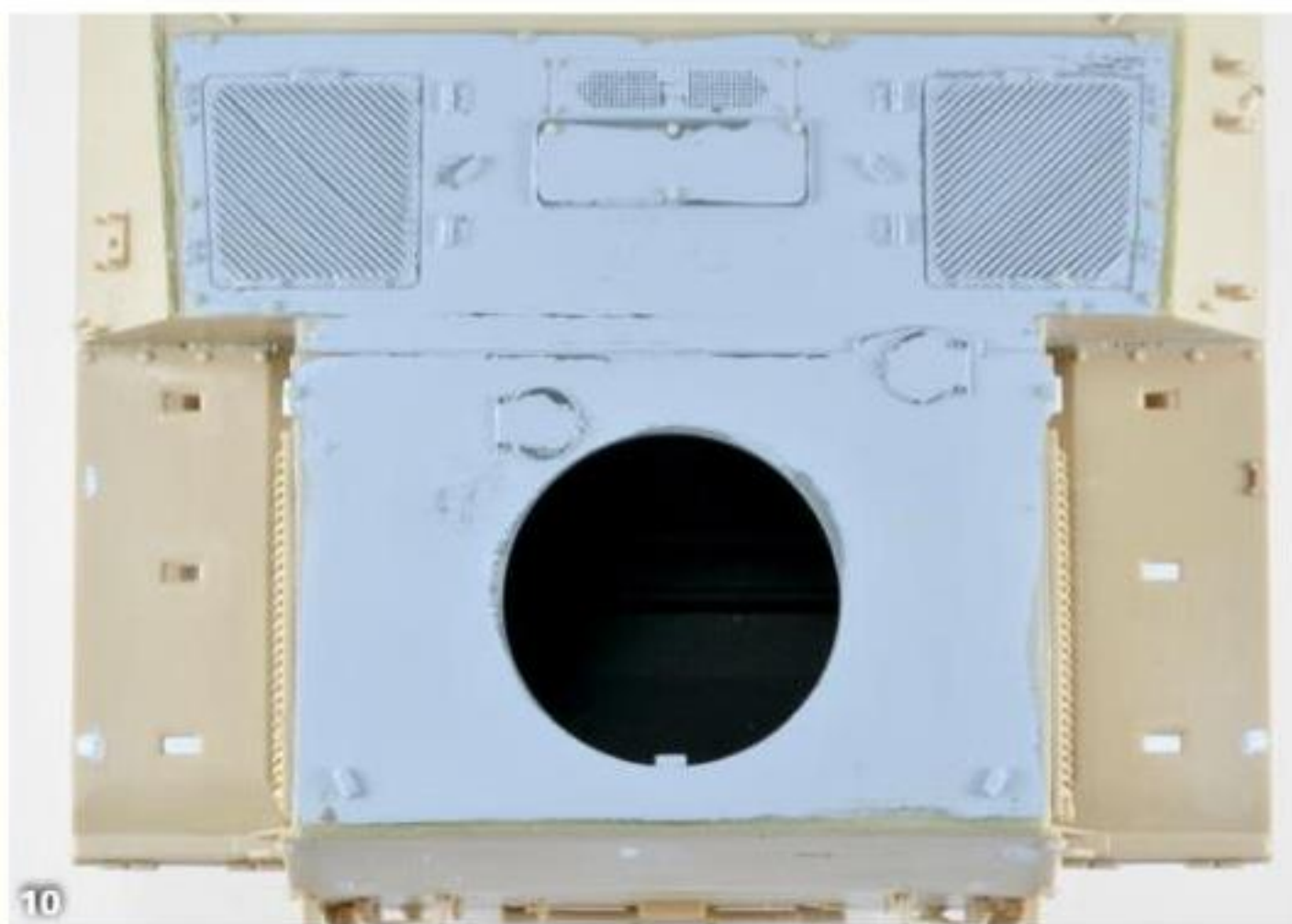
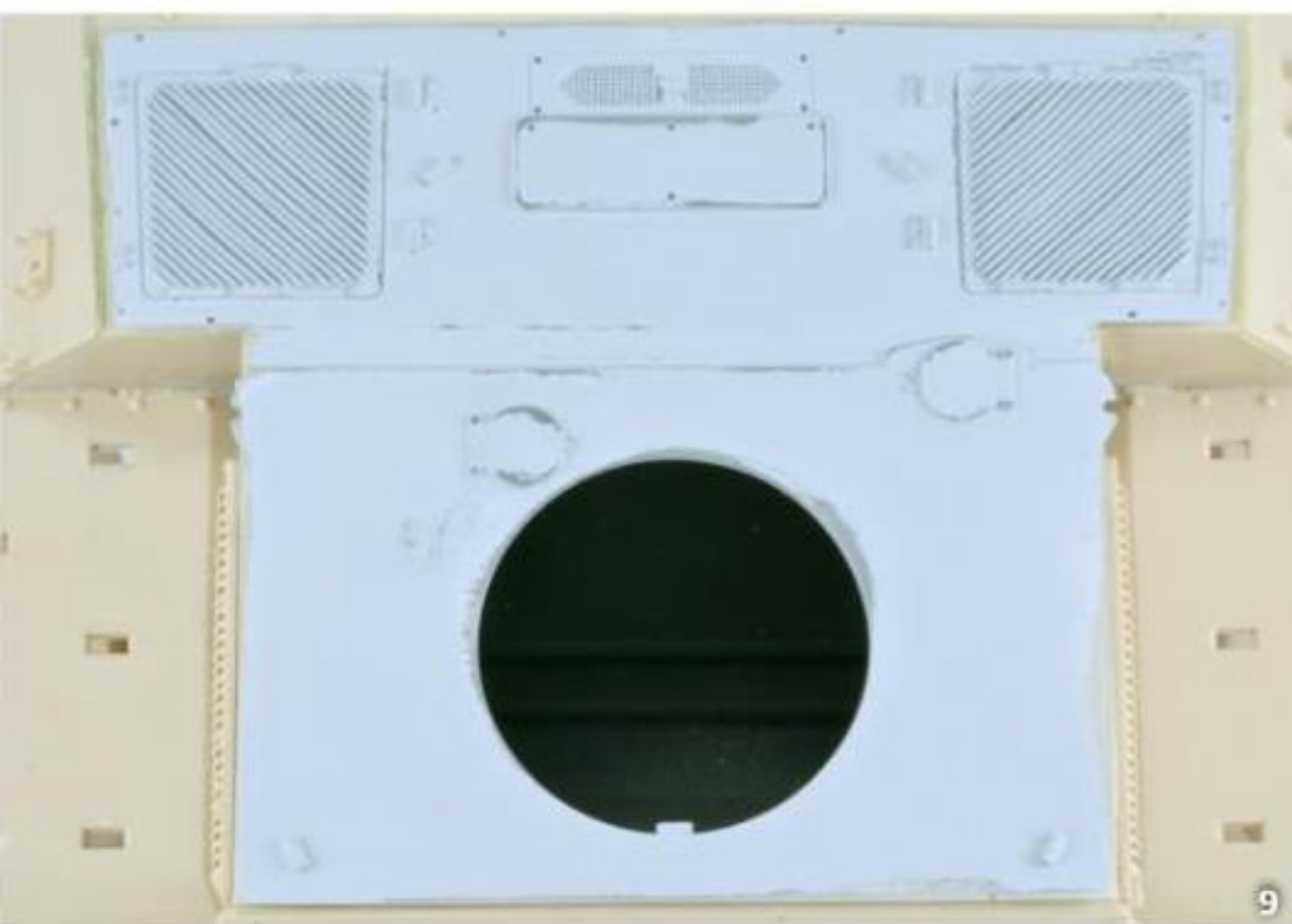
Location of 3D parts

We will list all the parts, designed and printed, that are necessary for the transformation, identifying each of the developments and designs.



Engine hatch

It is one of the largest parts of the modification kit. The differences with the original are substantial and practically no original parts were used, except the fan cover. It consists of two pieces, the lid and the protection grid.



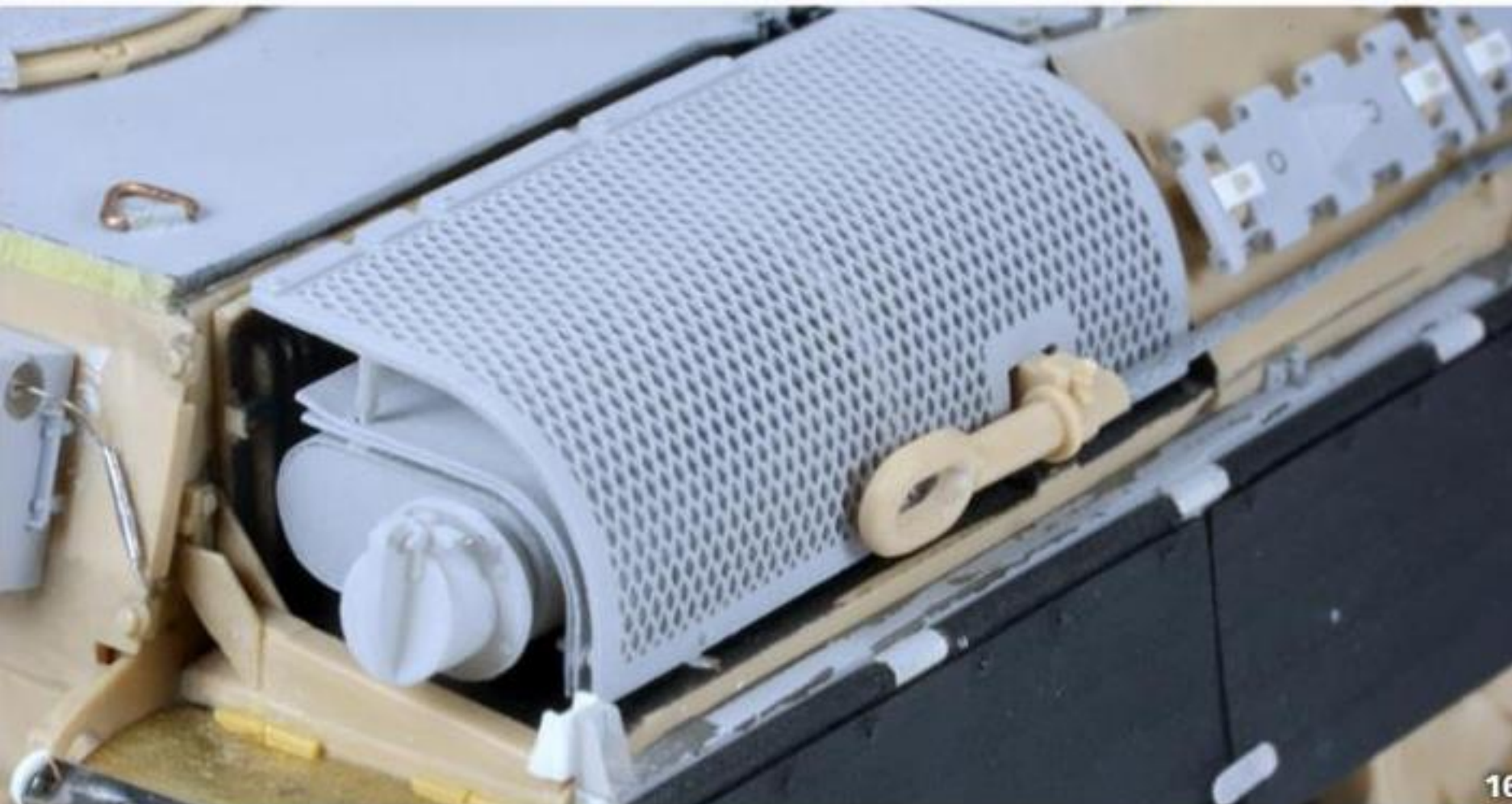
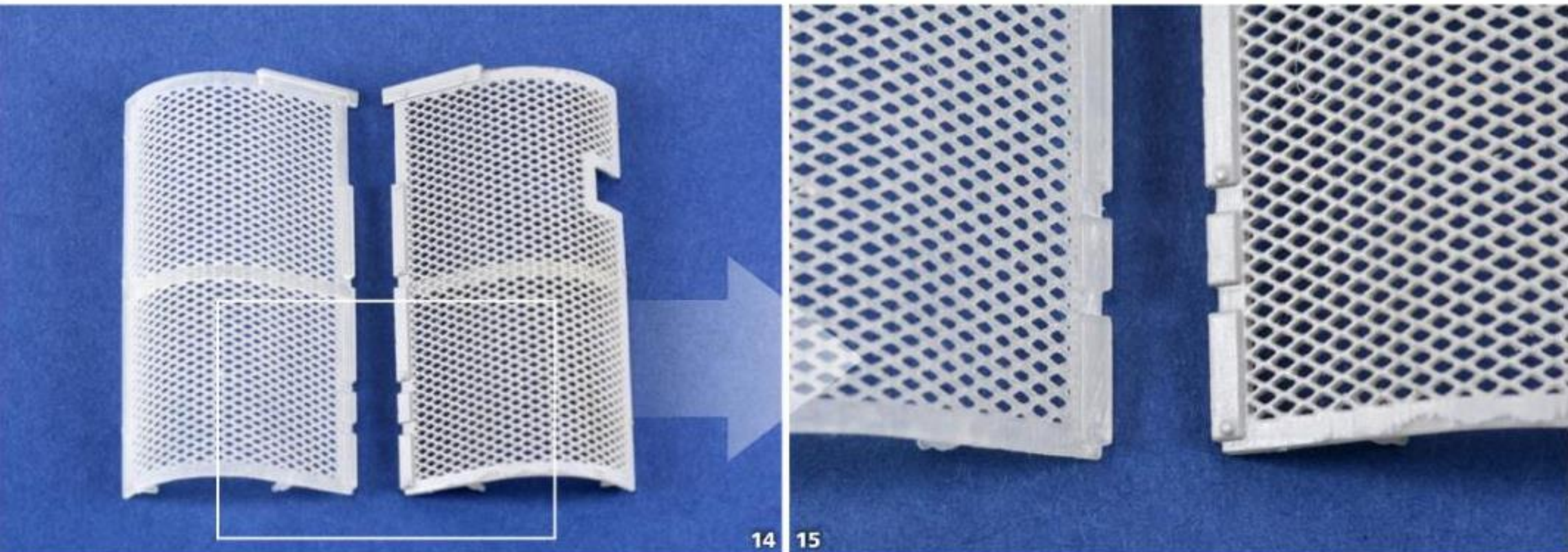
(8). 3D design of the engine cover together with the protection grill of the blowout of the fan, totally different from the original French pattern.

(9,10). The 3D piece perfectly fits the geometry of the hull. It is glued with cyanoacrylate and holes are drilled using the 3D part as a reference. We incorporate Masterclub nuts as well as the fastening elements on the central side elements. The detail of the grills of the battery compartments is fantastic, with a reliable reproduction of the slats.

(11,12). The fan protection grill is one of the parts perfect for 3D printing, even improving upon photo-etch parts, giving a hyperrealistic appearance. You can see the part in picture 11 just as it has left the printer and fully primed in picture 12.

Exhaust

The exhausts are one of the most interesting parts due to the changes made by the Spanish army. They are much more bulky in shape and have curved protection grills. They result in softer lines than the angular version. The new exhausts consist of three 3D printed parts: the exhaust, the outlet valve and the protection grills.



(13). The 3D design shown here corresponds to the right exhaust, including the opening for fastening the towing cable. The gas backflow lid has been redesigned to improve the detail of the part.

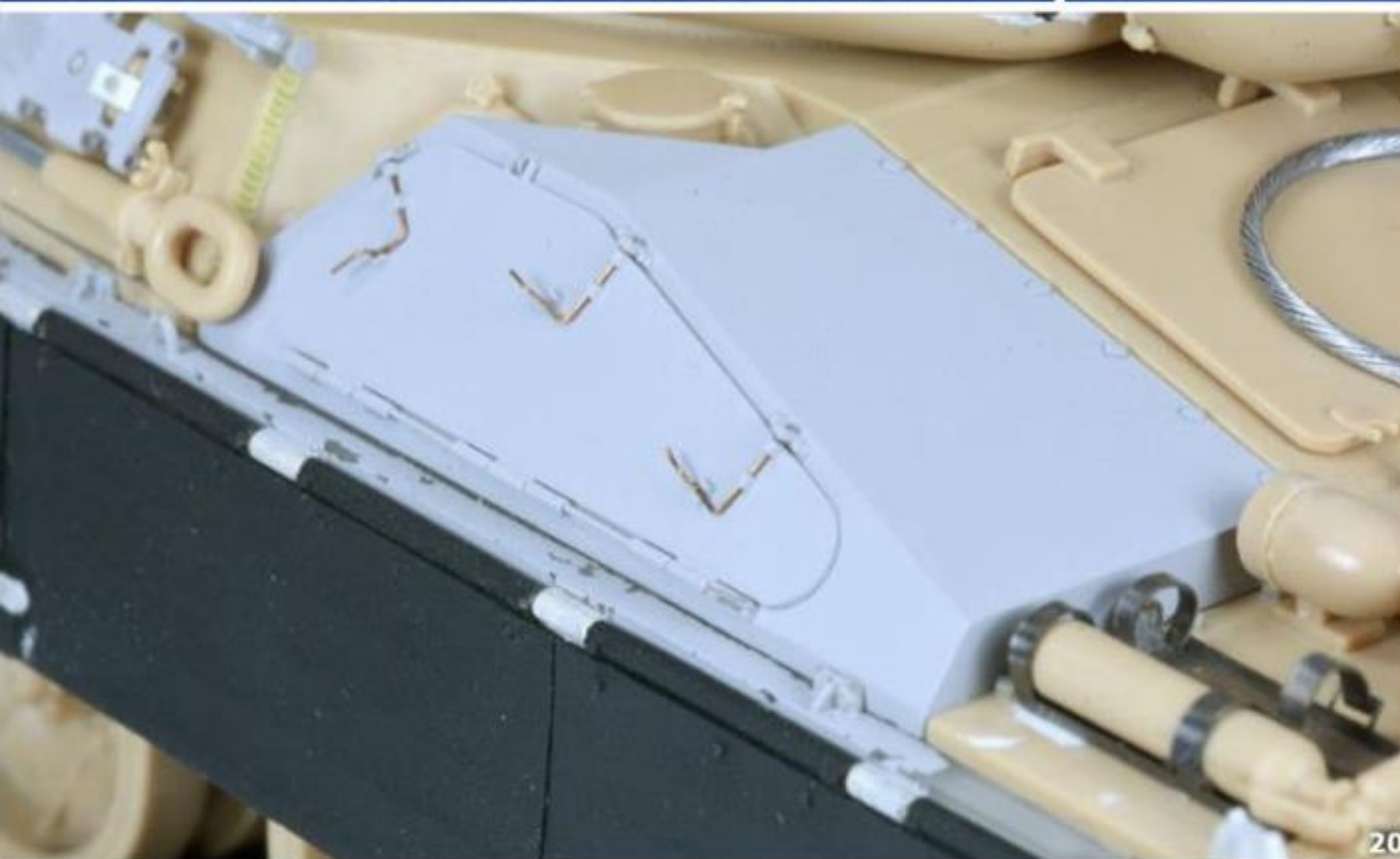
(14-15). A closer look at the printed grills. The one on the left has not been primed yet. The primer allows us to see the details as the printed part is transparent material.

(16). The printed and installed part has a superb appearance. We see how the cable bracket fits perfectly. It is also fixed in the holes for the original part provided in the plastic model. To facilitate the painting process we do not glue it. The towing cable is fixed in place, but doesn't make it difficult to remove the grills. The locking ring in the lid has been replaced by one made of metal sheet. The thinness and fragility of this part makes it too delicate for 3D printing. It would easily break.

Again, the protection grill is one of the best parts of the kit. As with the fan protection, the grill is much better than the PE parts, not only for the detail, but also for the simplicity of its installation. It also has a series of rods that are introduced in the holes in the exhaust part, just like the real-life exhausts. The upper part perfectly adapts to the structure of the plastic kit so it does not present any problem.

Stowage box

This is a part that the MENG kit depicts perfectly. It can also be detailed and altered with improvements including the mentioned photo-etched parts. However, by creating it in 3D we can have the stowage box in two parts, the box and the lid, allowing us to show it open.



(17). This is a part that the MENG kit depicts perfectly. It can also be detailed and altered with improvements including the mentioned photo-etched parts. However, by creating it in 3D we can have it in two parts, the box and the lid, allowing us to show it open.

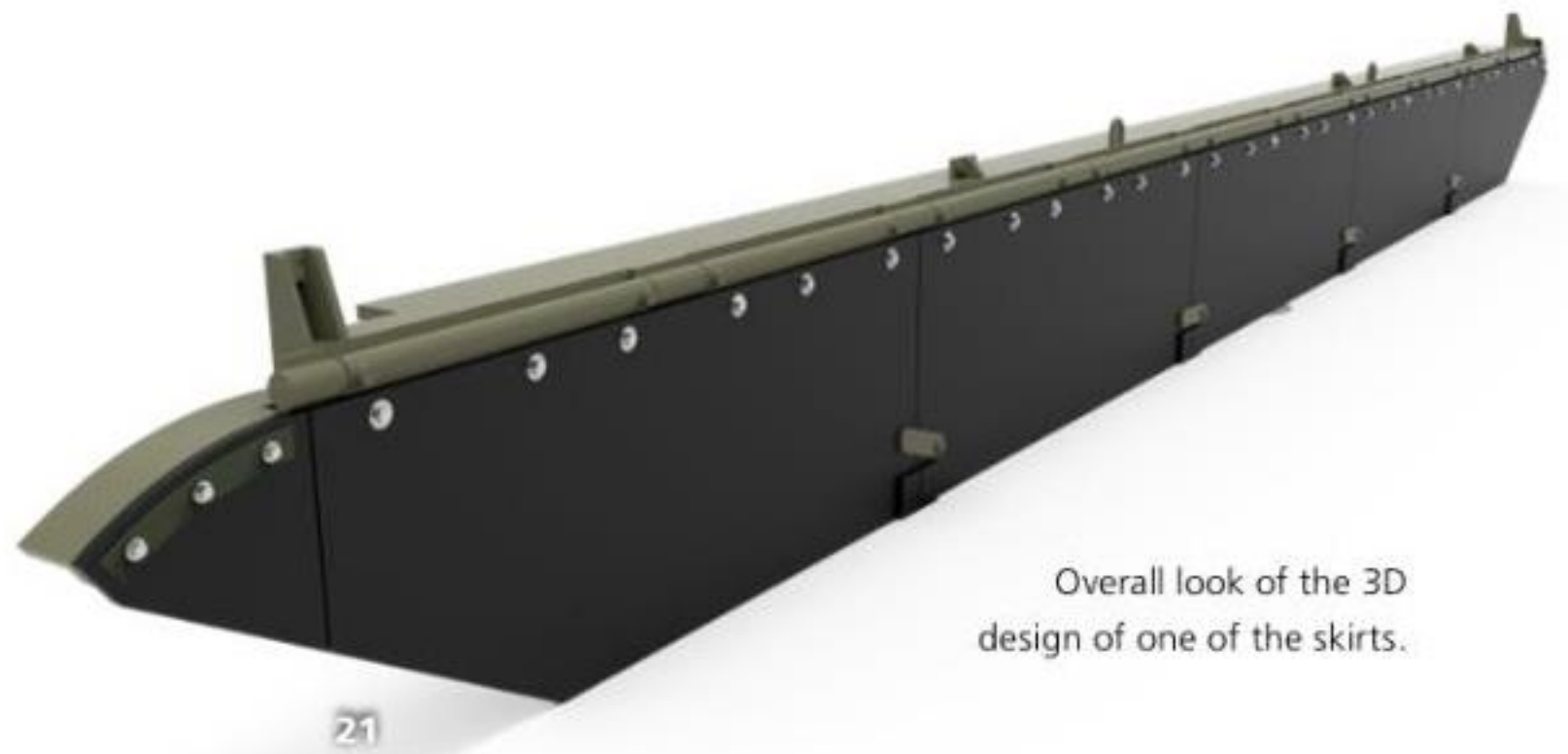
(18,19). Here you can see the part cleaned and sanded before the layer of primer. The clamps are simply perfect, so much better than the ones provided in PE.

(20). The improvement of this kit part is substantial, thanks to the large planes. The closing elements must be made with copper wire of the appropriate diameter. Thanks to the predetermined holes the placement is very simple.

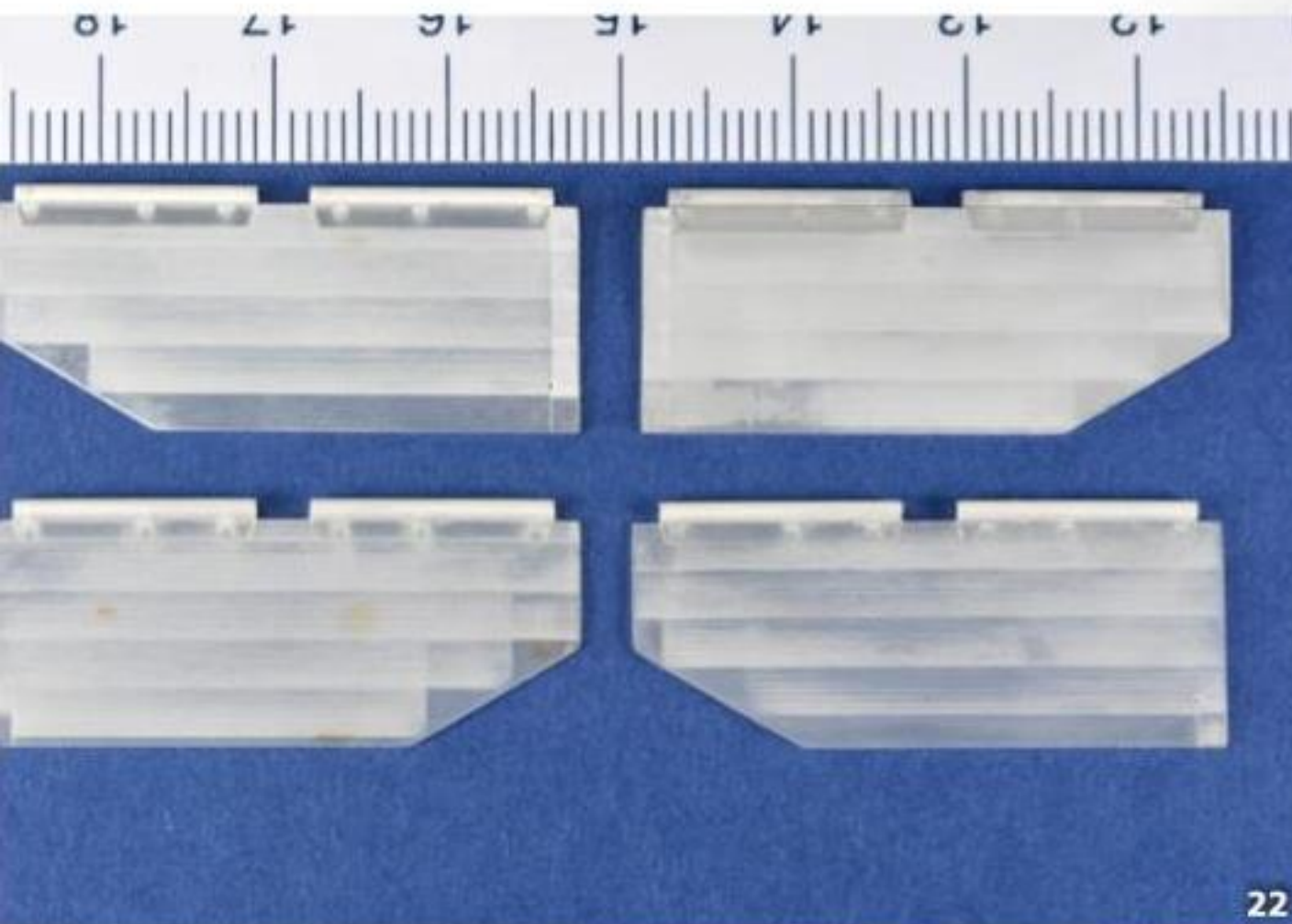
The part fits perfectly, but we must take into account several aspects, such as the position of the towing cable that should be modified. Otherwise it prevents the box from opening. The rear beveled edge must be sanded down and the gap between the fender must be filled if you want to leave the door open.

Side skirts

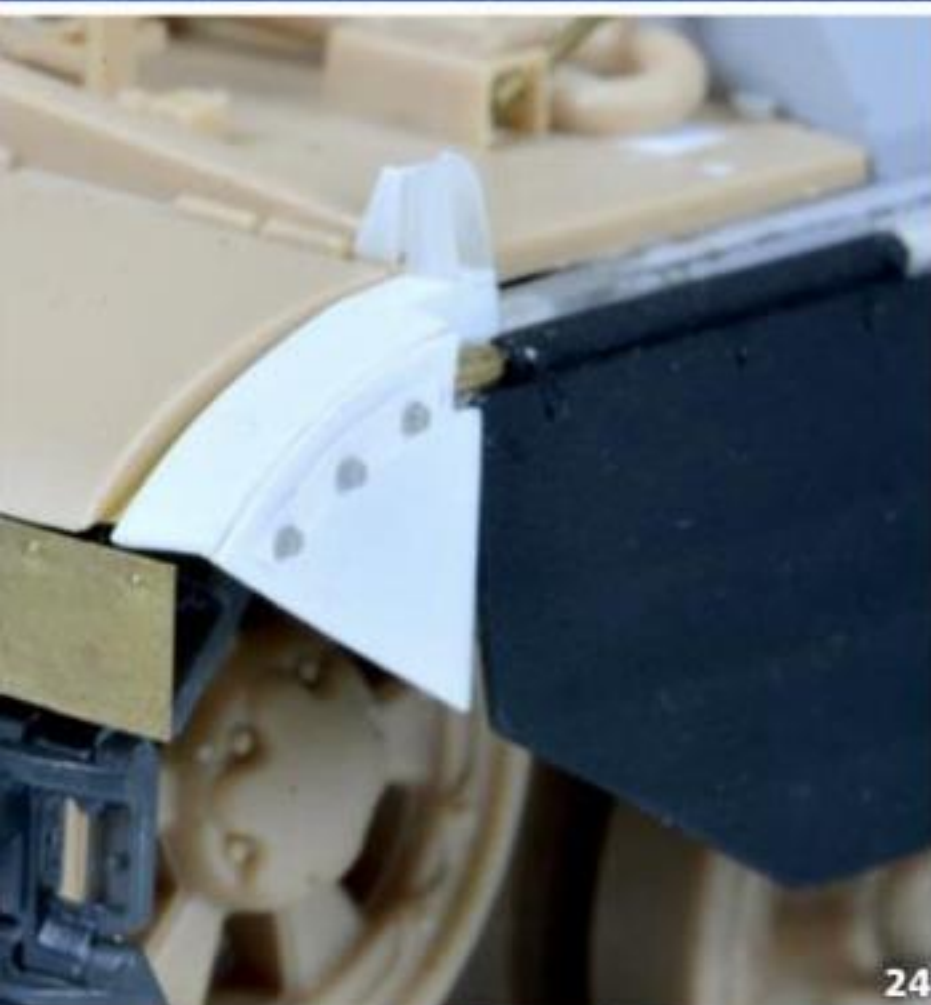
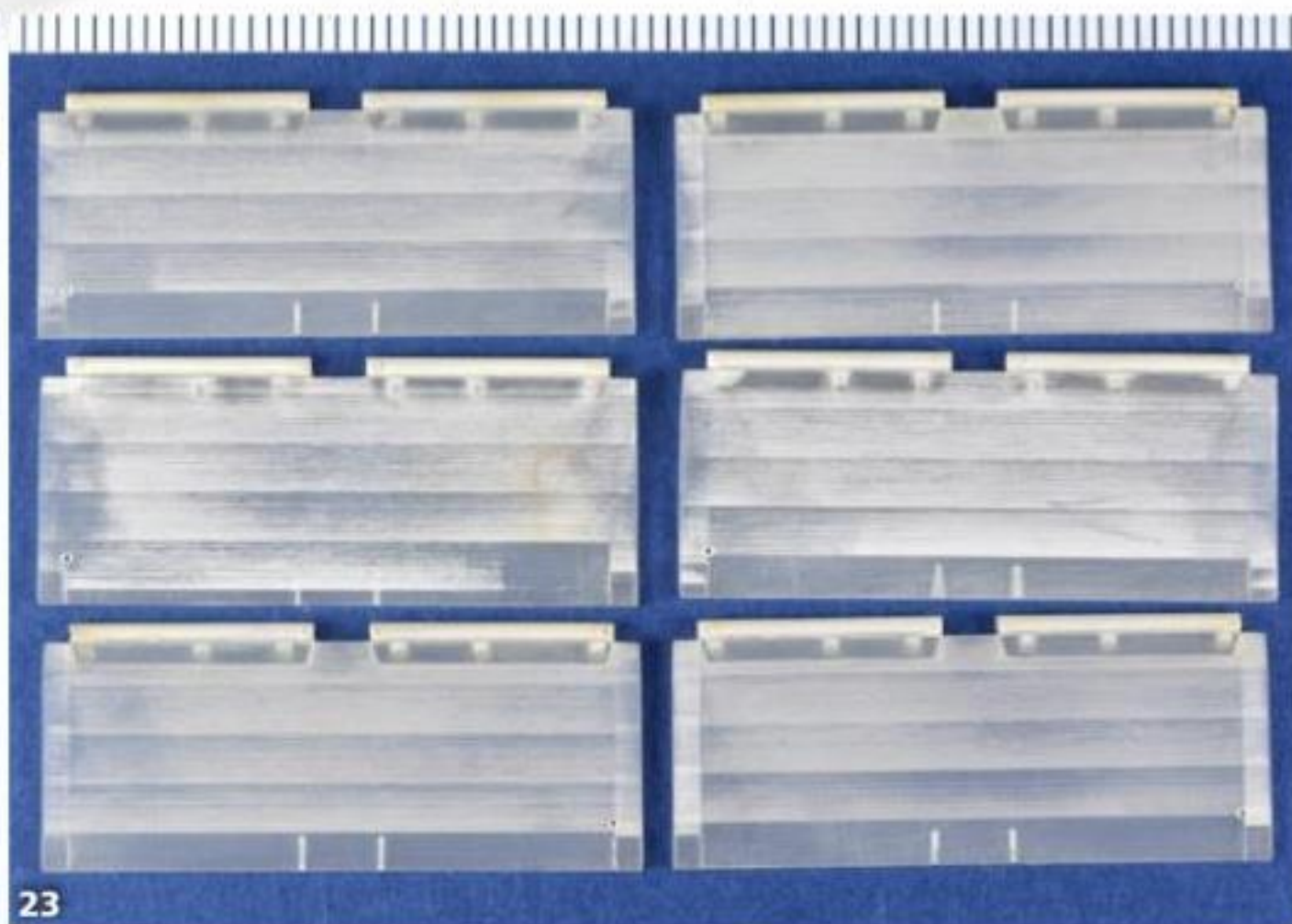
One of the most characteristic elements of this vehicle are the side skirts protecting the running gear. Usually these kinds of parts made of plastic or resin are rough and excessively rigid to work with so you have to invest large amounts of time to get them to look realistic.



Overall look of the 3D design of one of the skirts.



22 23



24 25



(22,23). The skirts have been created in individual parts. The holes are perfectly reproduced, both in the attachment brackets and for adding the closing elements and handles.

(24,25). Details of the front and rear fenders. The original front part from the kit is kept, adding the small skirt typical of the Spanish vehicles. We can see the detail of the extension of the side skirts. The part designed in 3D is used in the rear area. The fender is replaced by a scratchbuilt part in brass sheet.



(26). Once the skirts are installed the look is impressive. The skirts are also workable, adding great realism because of the possibility to place the closures in different angles.

Side details

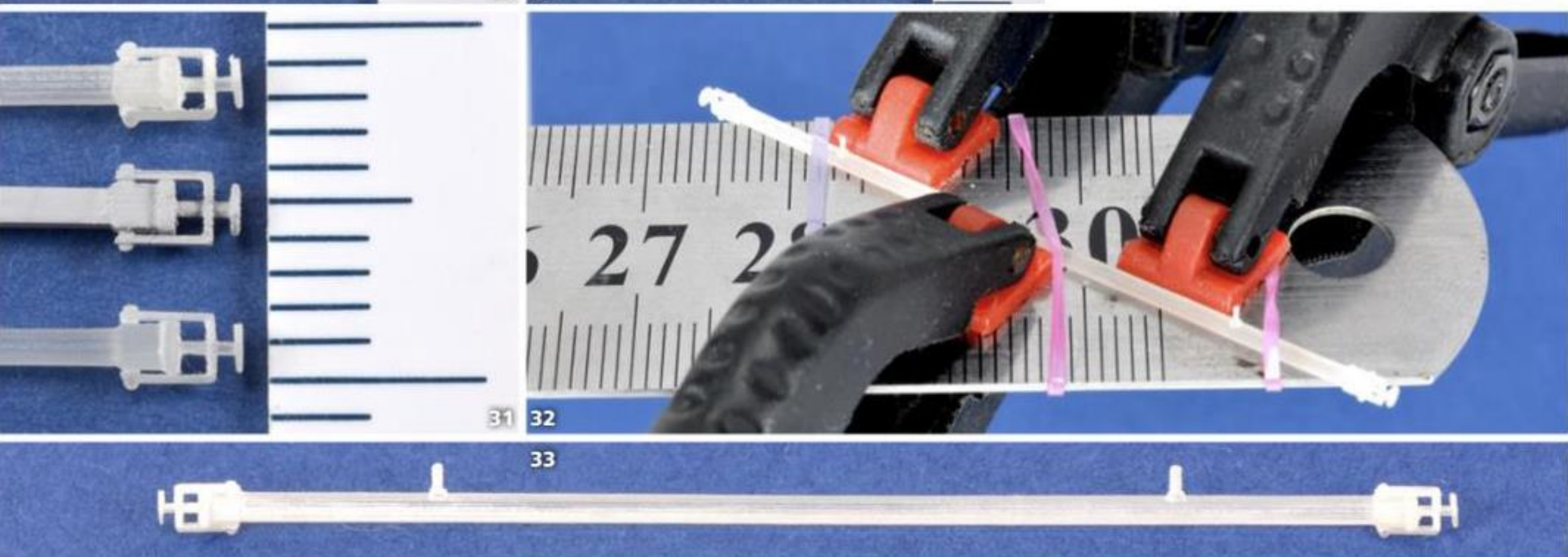
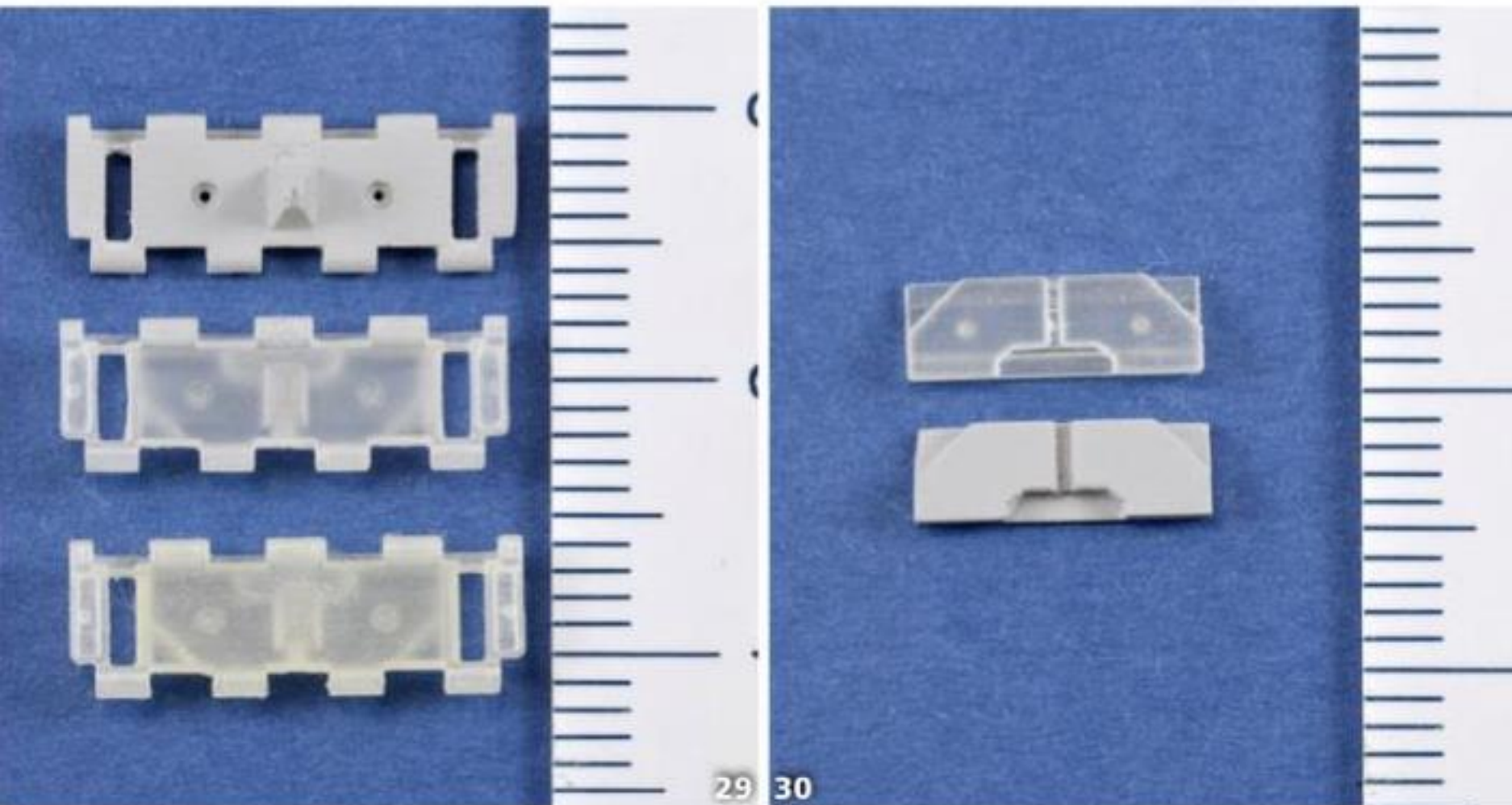
The AMX30 has a series of elements placed on its sides, such as the spare links, tools, towing cables and spare antennas. The layout of the Spanish version is similar to the French version, except for the incorporation of antenna holders. The parts designed in 3D are the links and the antenna holder. The clamps and tools are done with photo-etch parts, adding a metal cable and kit parts.



(27,28). The design of the link is complete and offers the option of including the rubber pad, which was also designed as a single piece.

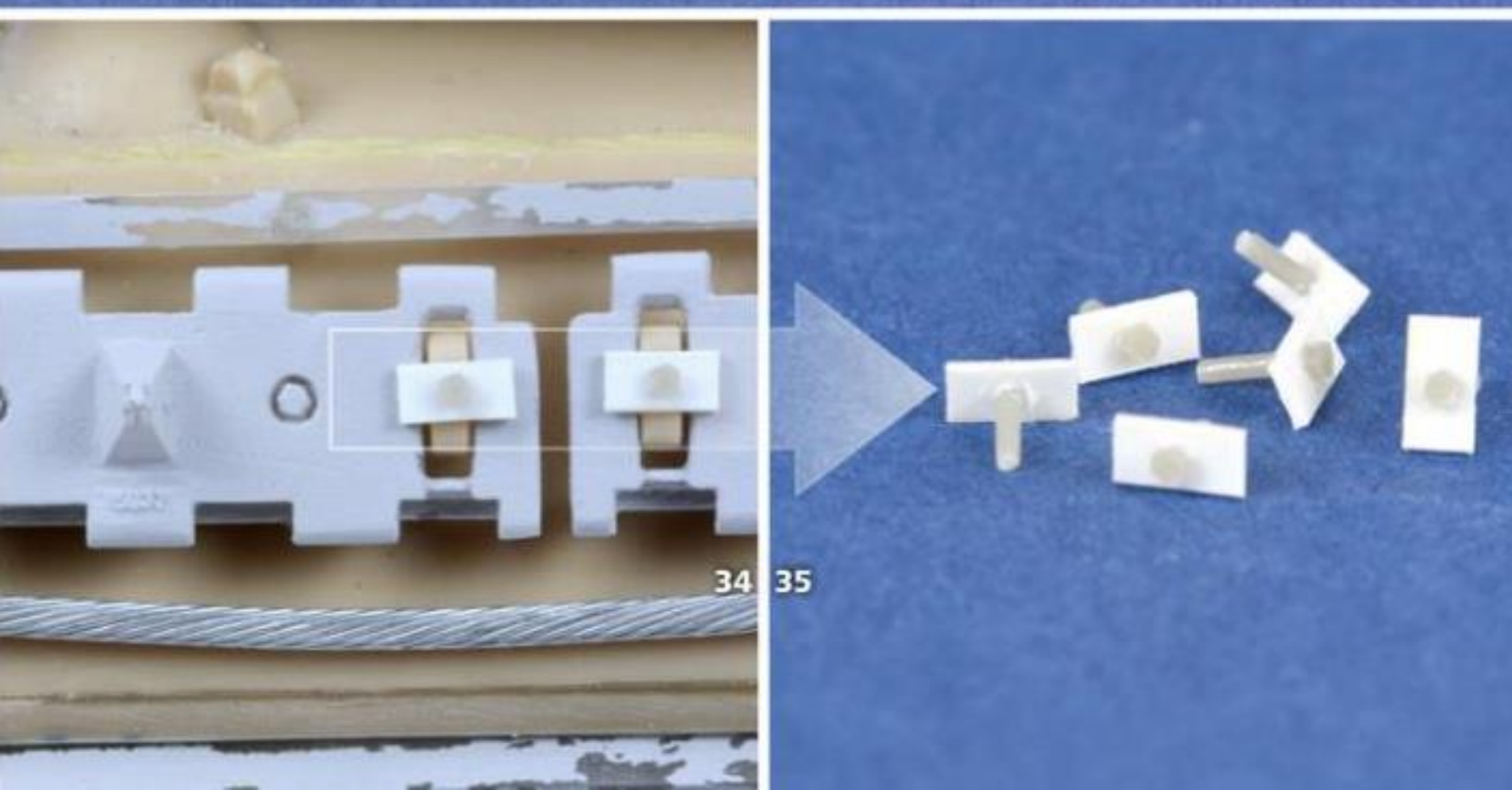
Regarding the antenna holder, this is a very simple element which incorporates the rods to fix it on the model.

(29,30). Detail of the post treatment on the links and replacement pads: cleaning, polishing and primer. The quality of the detail is very high. I think that in a couple years we will see kits manufactured by using 3D printing technology. The parts lack moulding marks or ejector pins, and holes are also faithfully reproduced.



(31,32,33). Detail of the antenna holder. Due to its length it bends a little bit so it must be straightened by fixing it in the correct position and applying hot water.

(34,35). Detail of the fastening system of the spare track links, scratchbuilt with plastic and Masterclub nuts.





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(36). Detail of the placement of the elements on the right side. The wire is from RB Models.

(37,38). The attachment system, as in the previous case, has also been scratchbuilt.

(39). Detail of the left side where part of the tools and the pads of the spare links are placed. The tools clamps are from Eduard's PE set.

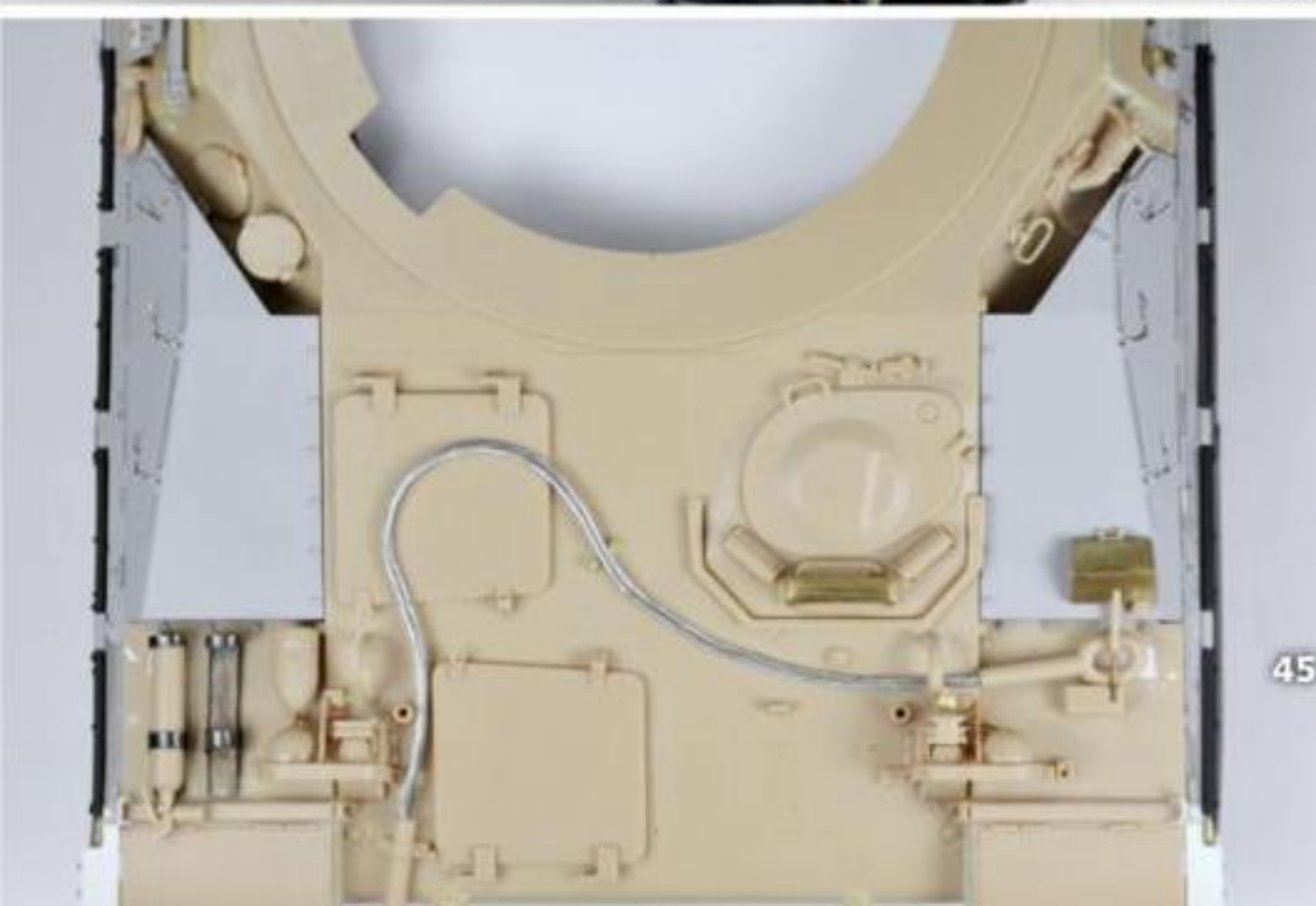
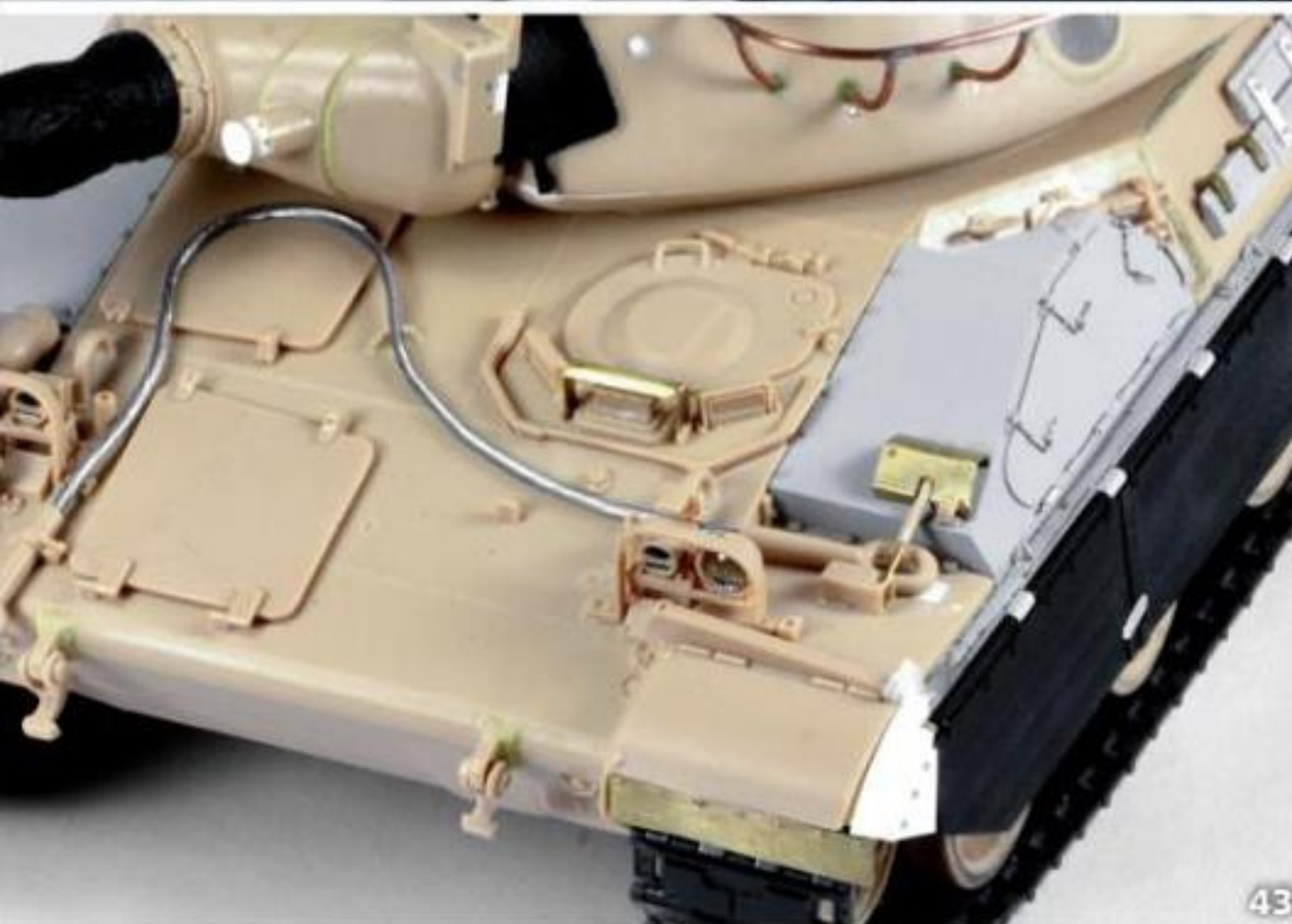
(40). Detail of the assembly of the tools.



40

Vehicle front details

The AMX30E2 requires a repositioning of the fire extinguishers and the combat light. These are necessary modifications even if they do not require any new elements. The headlights are from SKP Models and some parts are made of brass, such as the periscopes protectors and the rear-view mirror.



(41,42). Detail of the relocation of the set of headlights and fire extinguishers. In this case the plastic parts are of high quality and the Eduard extinguisher holders are very spot on. The best parts however are the SKP Models lights that add a sublime look to the set. To top things off we create the electrical wiring with copper wire.

(43,44). Repositioning of the combat light on the left side and detail of the mirror and front periscope protector.

(45). In this picture we get a detailed overview of the changes we made.

Vehicle rear details

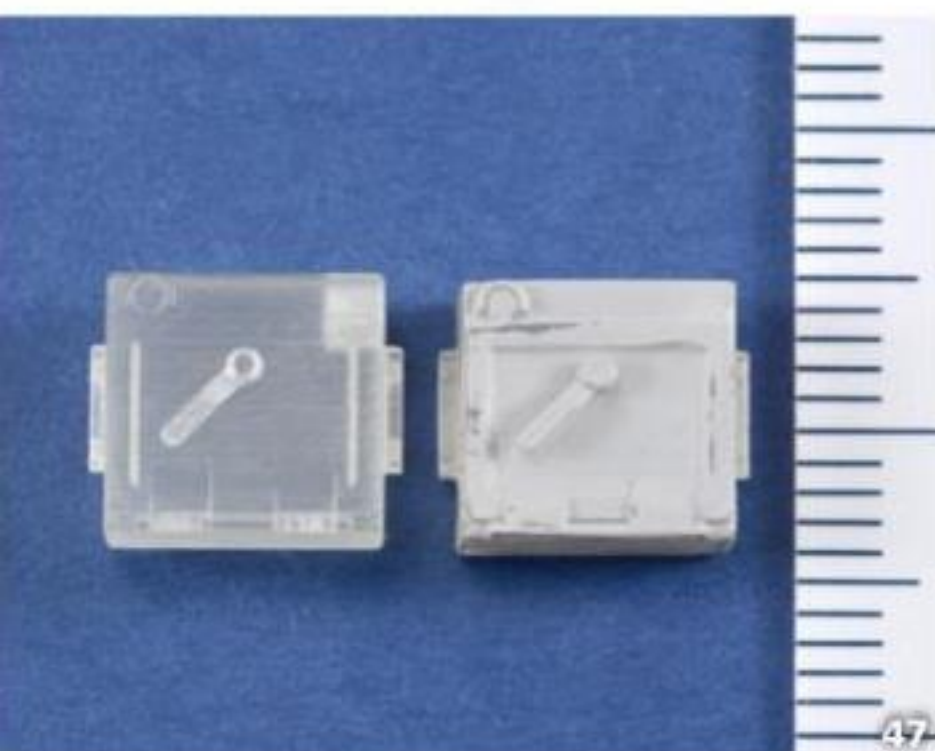
The rear part of the vehicle does not require major modifications to make the Spanish version, except for the replacement of the external telephone. It is a single part in 3D which highlights the detail of the handle.

The rest of the parts that make up the back are those from the plastic kit, with Eduard's PE or with parts made with iron and metal sheet. Photo-etched parts from the Voyager Models or Tetra Models Work sets perfectly represent certain details. However, not all parts from these sets were used.



46

The external telephone is printed as a single 3D part.



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48

(47). The look of the 3D part is very good, although the handle and brackets are fragile, so you must be very careful.

(48). The new external telephone only requires the addition of some wiring.

(49,50, 51,52). The Jerrycan holder was made with brass sheet, soldered to guarantee its integrity during painting and placement.

(53). In this image we see the final look of the back and the disposition of all of its elements.

(54). In this image you can see the engine cover with the lifting hooks in place. The welds are made with putty.



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Turret

Let's have a look at the turret modifications.

LOADER'S HATCH

This part is one of the most visible elements of the vehicle. Changes made by the Spanish army include the support for a Cal. 50 (12.70mm) Browning machine gun. The set was designed in six parts and allows rotation on its axis. The mechanism for opening and closing the hatch lid is designed in two parts and is workable allowing the hatch to be open or closed.



55

This part is totally workable.



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(56,57). To incorporate the 3D set in the turret we must cut off the plastic surplus. Once the part is fixed to the turret we can add the weld lines. Although it seems fragile, once glued, the set is strong enough and perfectly holds the resin Browning from K-59. In the image we can spot the closing mechanism on both sides of the hatch.

COMMANDER'S HATCH

Around the commander's hatch a series of improvements are added, some in 3D and others in scratch. These include the periscopes that the MENG model does not provide as clear parts, the optics of the binocular periscope, improvements of the ammunition drum, the stand and the auxiliary weapon, as well as the IR projector.



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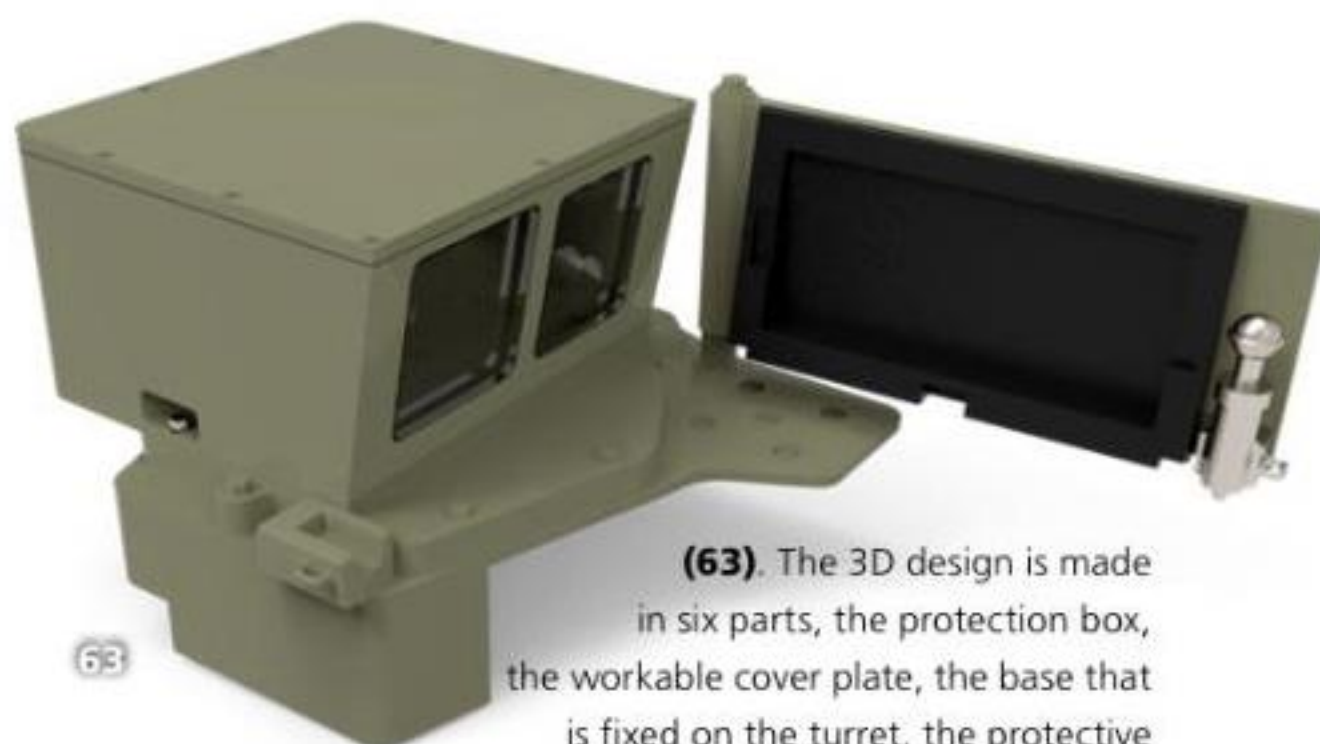
58

3D design detail of the MG-3 bracket, together with the IR search light and the element for fastening the ammo collection bag.

(59,60,61,62). This set of images shows the work on the cupola, rebuilding its shape and incorporating the mirrors of the periscopes, the mirror inside the optical prism of the binocular telescope, the nuts, detailing of the clamping of the part, improving the ammunition drum with tape, adding the bracket of the auxiliary weapon and the IR search light.

AIMING SYSTEM

One of the elements incorporated in the AMX-30E2 was the Hughes MK9 targeting system that integrated the laser range-finder, the thermal camera and the meteorological sensor. The optics of these devices are in front of the commander's hatch, protected by a box. We must prepare the surface properly to house the designed parts, eliminating the unnecessary plastic and using the existing recess that used to accommodate the part of the French model.



(63). The 3D design is made in six parts, the protection box, the workable cover plate, the base that is fixed on the turret, the protective glass, the closing stops and the part to seal the right side window.



(64,65). In these pictures we can see the placement of the protection box, in this case closed, and how it perfectly adapts to the model. We only have to create the welds on the side, as well as the sealing part of the side window, made with putty.

WEGMANN SMOKE DISCHARGERS

The original French dischargers with two units on each side were replaced by the German Wegmann type with four units per side. The bracket was adapted taking advantage of the same anchor points as the original kit parts.



(66). The design demanded a correct measurement of the angles of orientation of each of the tubes, as well as the arrangement of the brackets.

(67). The set consists of seven parts: a bracket, two adapters and four tubes. This is one of those parts that should not be manufactured with this kind of technology since it loses a lot of detail and it is very difficult to manipulate.

SIDE WIND SENSOR AND ANTENNAS

The antenna bases were also modified and an instrument for the measurement of the lateral wind was added. Regarding the instrument for lateral wind measurement we had to improvise since we didn't have all the information.



(68). Antennas and side wind sensor created in one piece. We added a clamping rod for inserting it in the kit.

(69,70). The result is totally satisfactory. It is true that the wind sensor bracket would be better in turned brass since that would provide greater resistance.



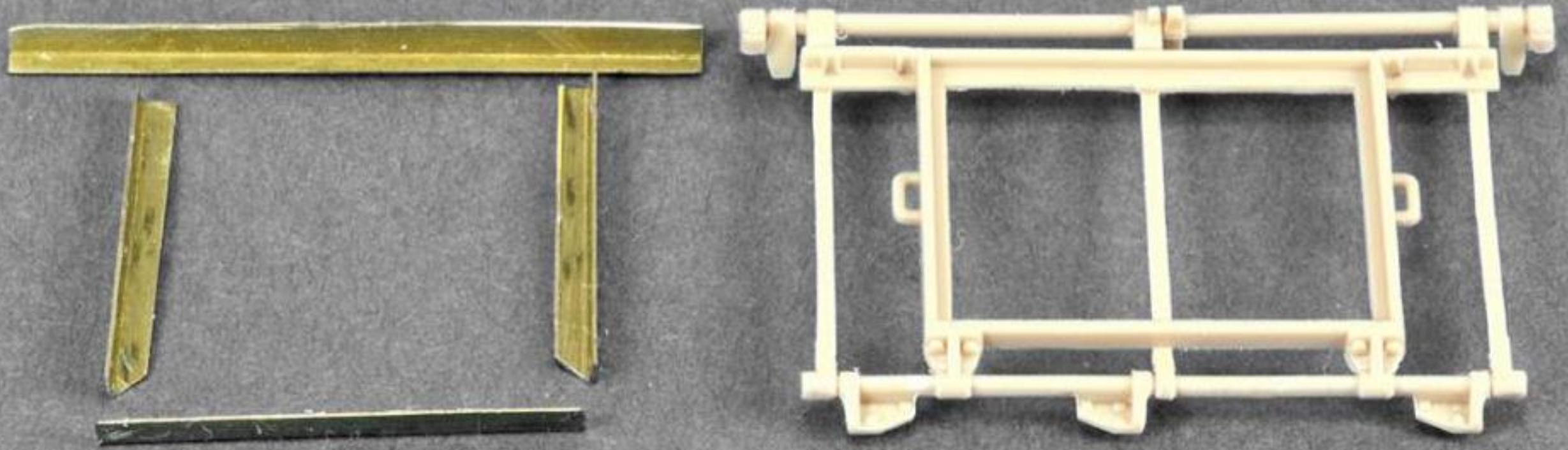
TURRET DETAILING

As with the hull, the detailing has been completed with a series of improvements based on materials other than 3D. Maybe one of the most relevant changes has been the replacement of the plastic side baskets by ones made with copper wire, for obvious reasons. We used 0.7mm copper wire. Possibly the most adequate would have been 0.6mm, but given its fragility we ruled it out.



(71,72). The baskets were a real challenge, both for the realisation of the welds and for their attachment to the kit. This clearly is an element where a replacement by 3D printing would not have improved the kit.

Another of the detailed elements was the upper part of the rear box. This contains a metal structure made with metal L-shaped profiles. The ones provided in the kit are way too thick. Photo-etch sets included parts for this, but we created it by soldering brass parts.

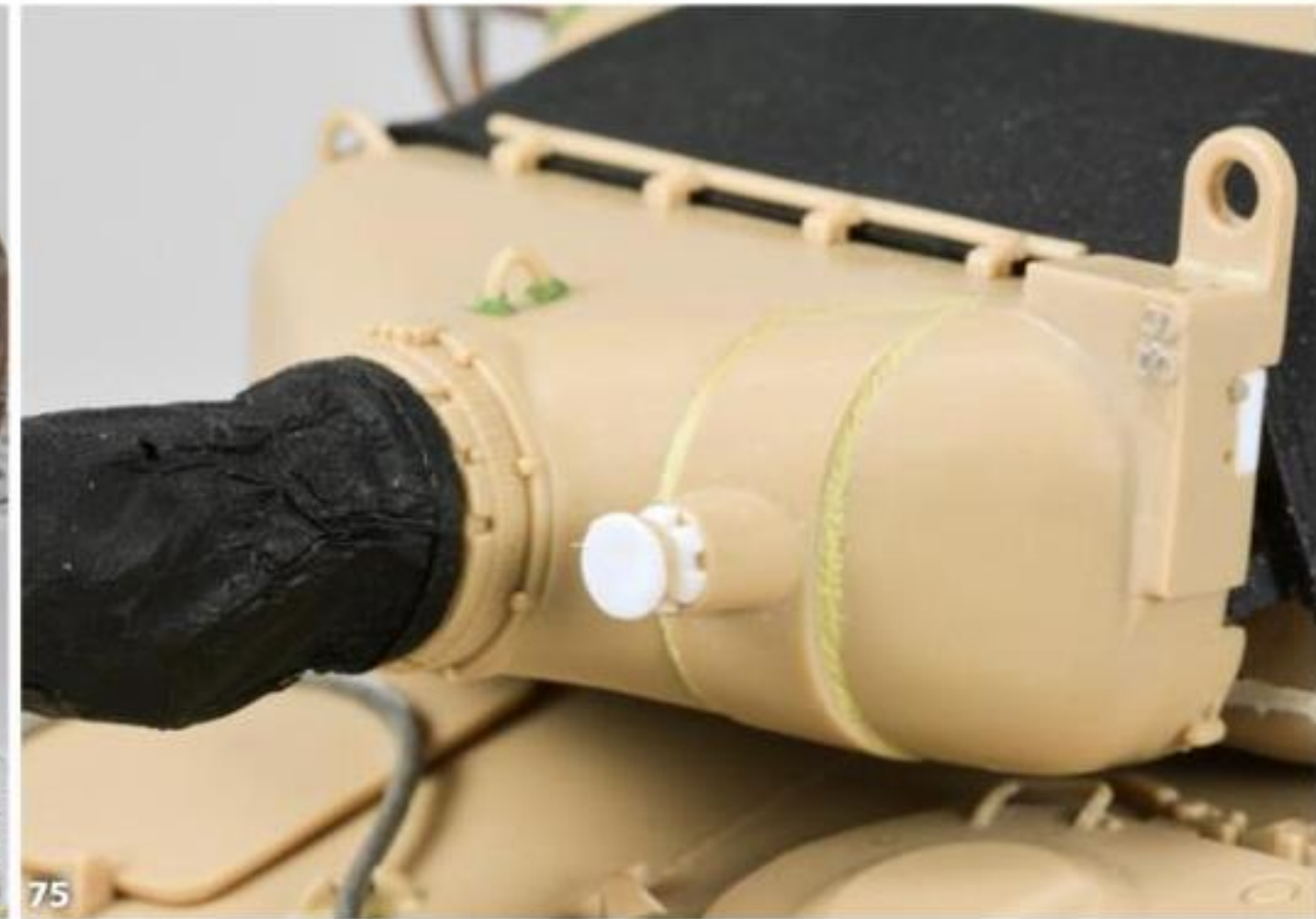


73

The measurements were obtained directly from the plastic part. Part of the structure was used after cutting and it also serves to shape elements. The rest of the work consists in soldering the parts and fixing them to the plastic kit structure.



74



75



76



77

(74). The result is very attractive, with the right thicknesses and much more realistic.

(75). Welding of the lifting mechanism and sealing plug of the hole that houses the barrel of the coaxial weapon. We were not able to find a picture reference of this when consulting documentation on the 12.7 mm machine gun in Spanish use. Finally, the small side rings for the straps of the baskets were added, as well as small details like the old structure that housed the antennas, the mould reference marks, the welds reproduced with green putty and other small details.

(76,77). Top view of the turret showing the work done on the baskets as well as the layout of the rest of the details.



Conclusion

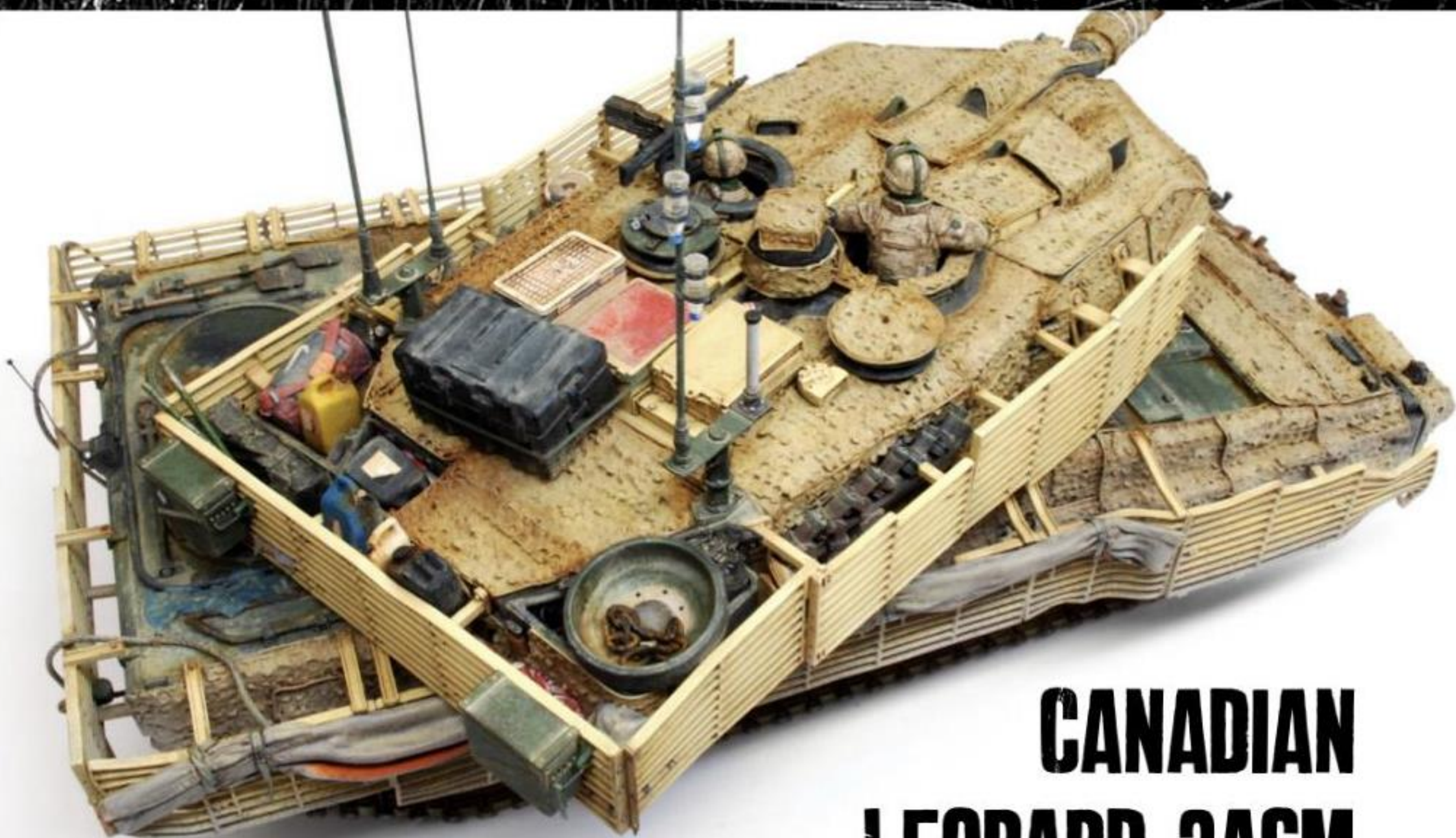
Even in the case of a very accurate, high-quality model kit like this one improvement is always possible, as we have seen throughout this part of the book.

But beware, sometimes it is only possible because technology allows it.

Certainly, we have reached very high quality standards nowadays. With the emergence of 3D technology many things are changing and the current situation is similar to looking at an iceberg. We don't know what's underneath and how it will affect our lives.

Maybe in the coming years we will be part of this new revolution in more ways than previously imagined. The DIGITAL REVOLUTION has arrived in the modeling world!

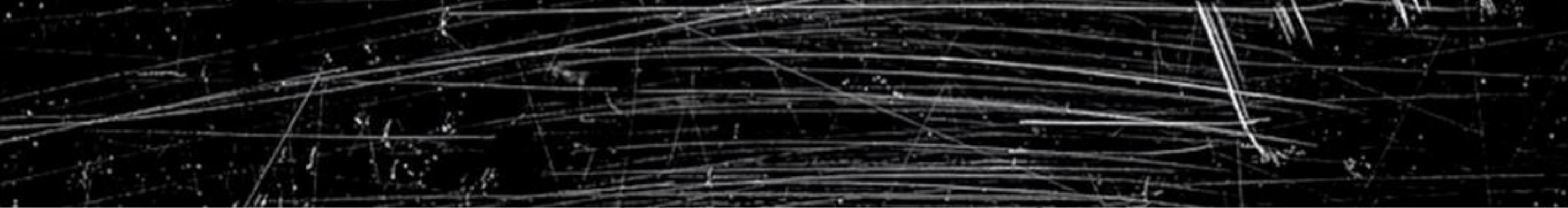
V. GALLERY



CANADIAN LEOPARD 2A6M

Hobbyboss







T80U

Xact Scale Models





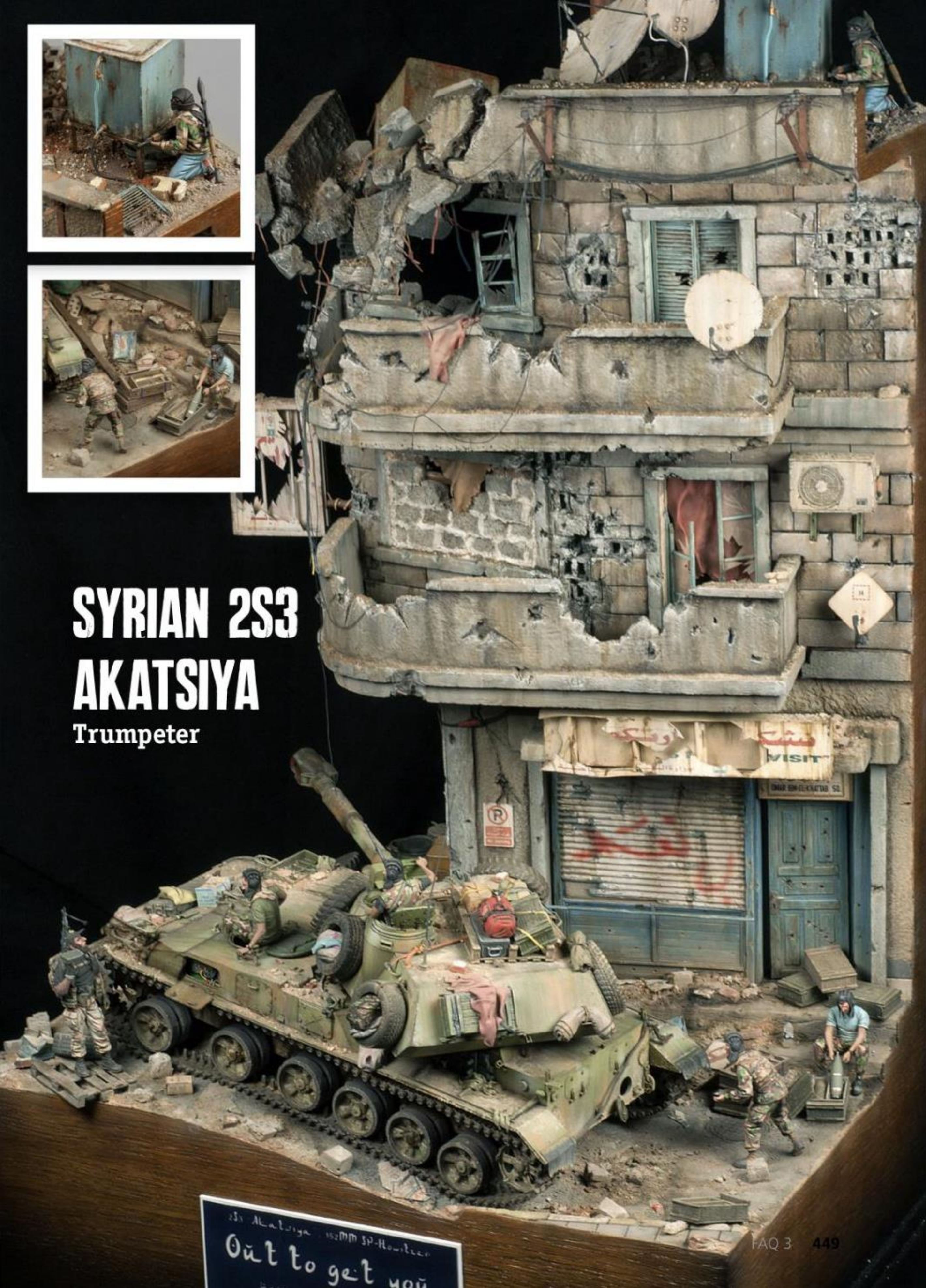
ZTZ96 B

Meng Models





SYRIAN 2S3 AKATSIYA Trumpeter



2S3 Akatsiya 152mm SP-Howitzer
Out to get you

BMR-3M

Meng Models



BTR-80

Trumpeter



BTR-70

Trumpeter





M1 BRITISH ABRAMS

Meng Models





URAL GUN TRUCK

Trumpeter



ZSU 57-2

Takom

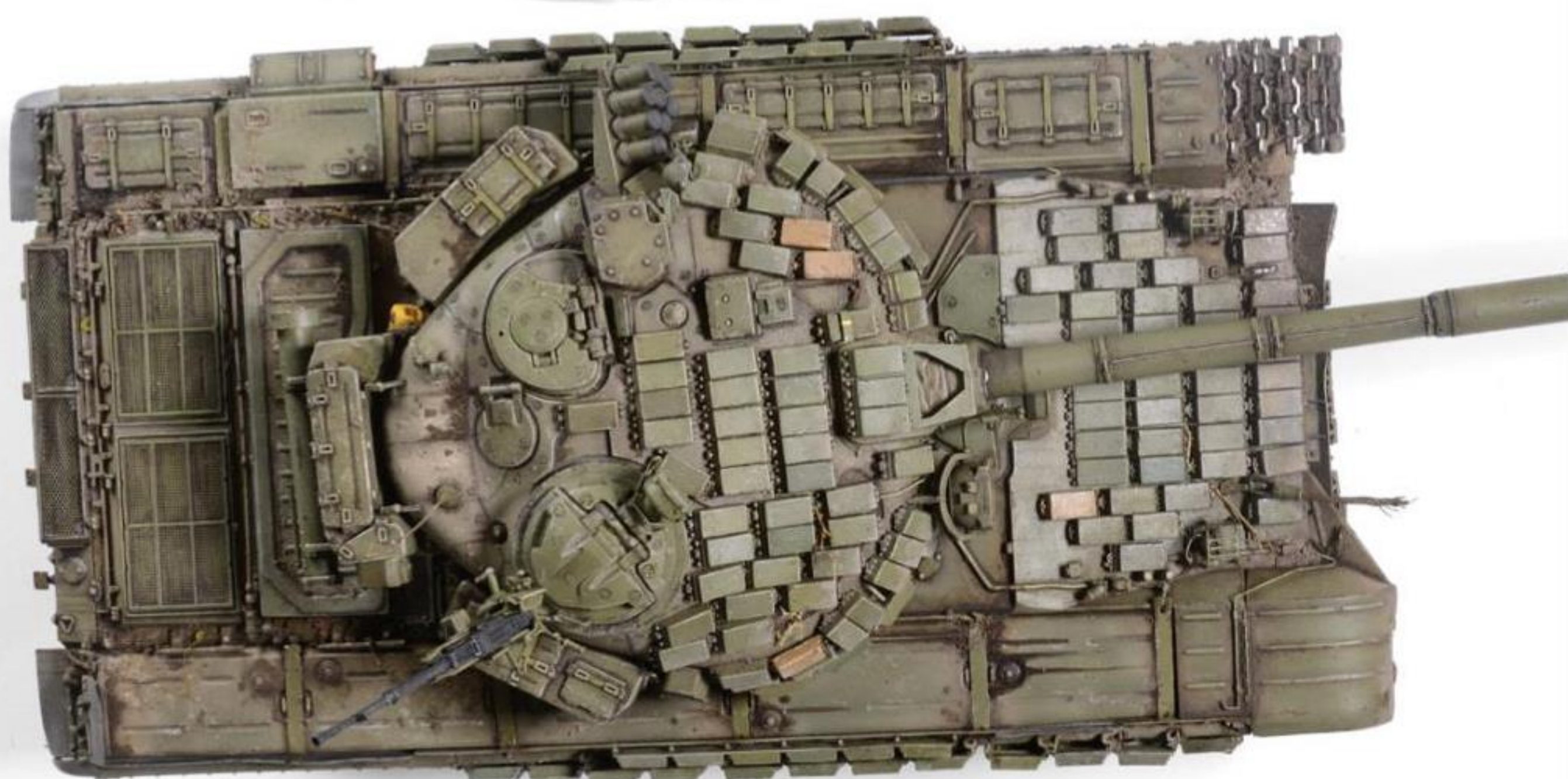


MAGACH 6
Academy /
Legend conversion





T-72B1
Meng Models





M88
AFV



PANDUR II

Trumpeter





TYPE 69

Trumpeter

LEOPARD 2A4

Meng Models



PANZERHAUBITZER 2000

Meng Models





MARS
Trumpeter





M-ATV

Panda





RG-31
Kinetic



T-55
Tamiya

AK 1/35 REGULAR MIMETIC NET

YOU CAN
DECORATE
THE NET WITH
ACRYLICS OR
ENAMELS



TYPE 1

AK8059: TYPE 1 - GREEN
AK8060: TYPE 1 - SAND
AK8061: TYPE 1 - PERSONALIZED WHITE
AK8066: TYPE 1 - FIELD GREEN

TYPE 2

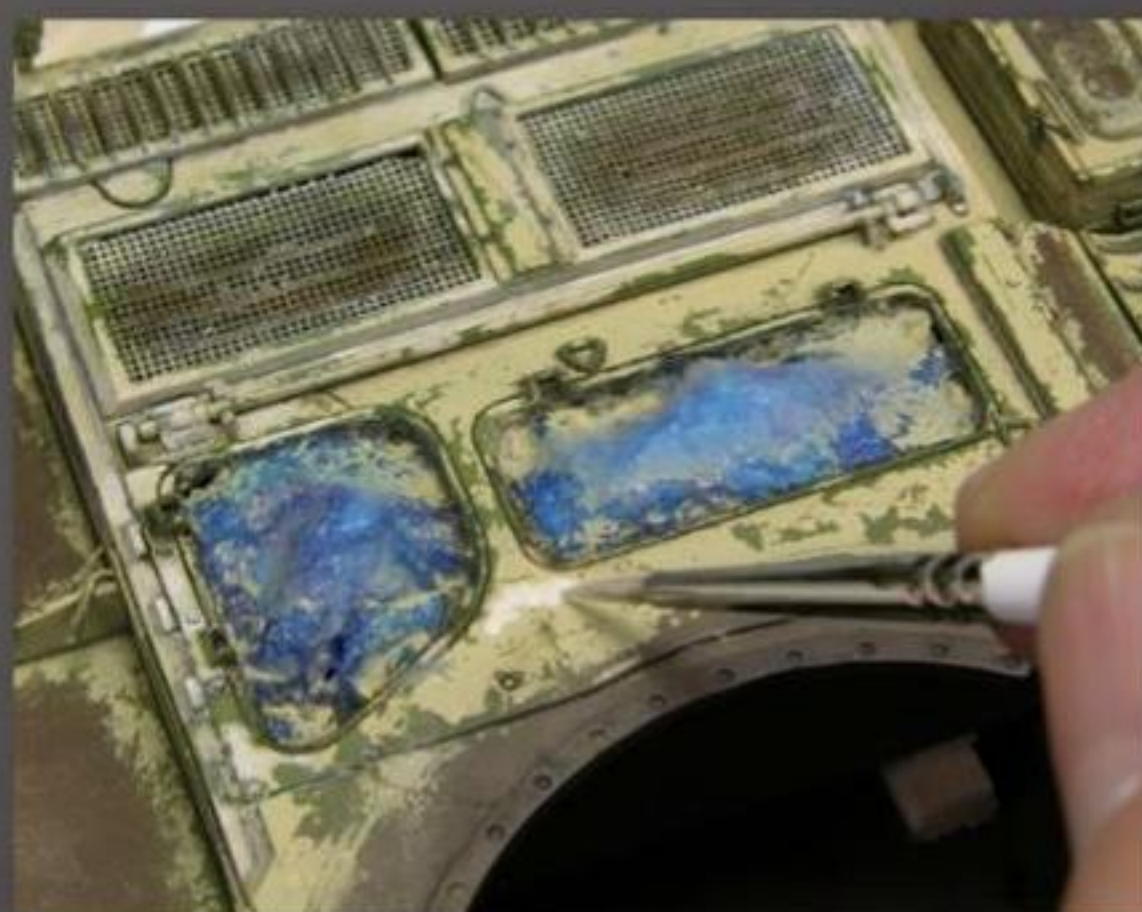
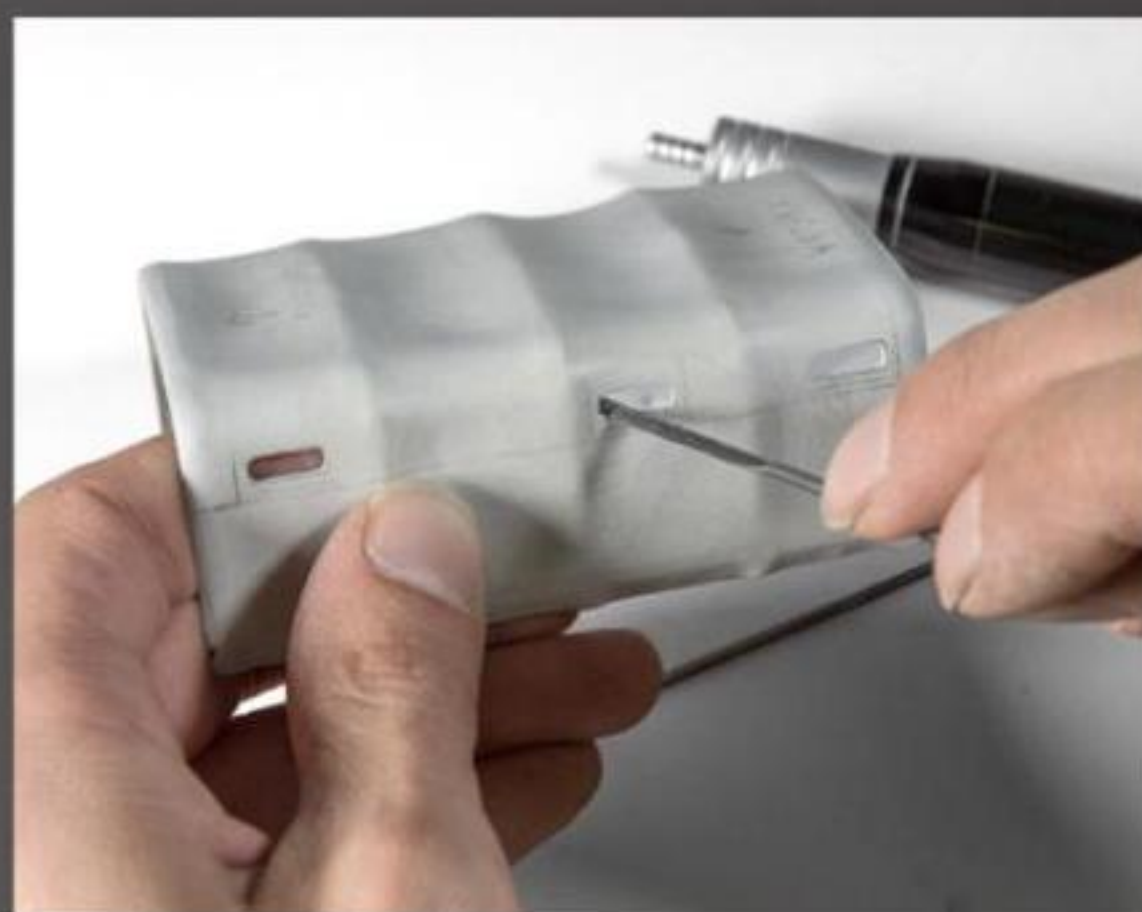
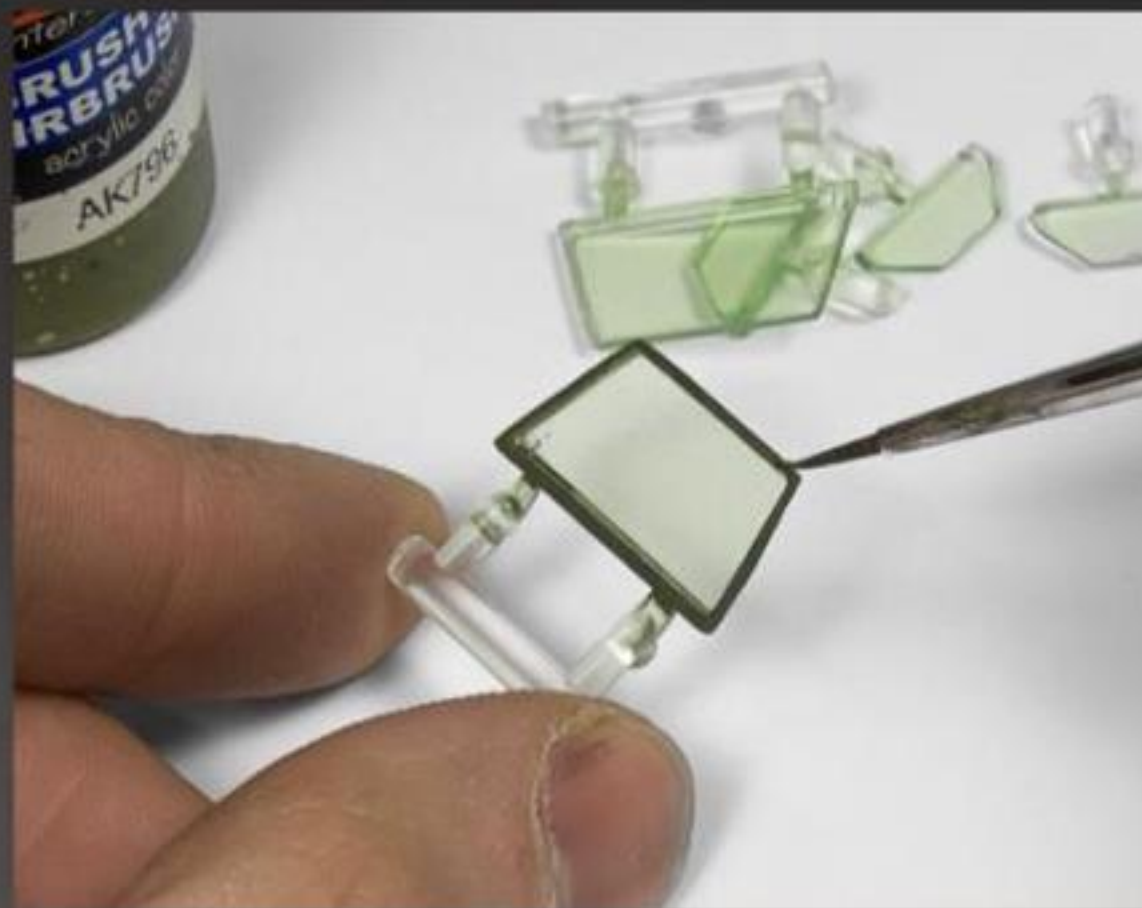
AK8062: TYPE 2 - BROWN
AK8063: TYPE 2 - PERSONALIZED WHITE
AK8067: TYPE 2 - FIELD GREEN



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